

CHEMICAL ABSTRACTS

Vol. 17.

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No. 3

1—APPARATUS

C. G. DERRICK

Construction of platinum thermometers and of resistance coils. J. R. ROSSBUCK. *J. Optical Soc. Am.* 6, 365-74(1922).—R. deals mainly with the avoidance of errors due to strain. An apparently new trick for winding is described. The wire is wound on a cylinder of wax or paraffin, which is then dissolved or melted away, leaving the wire supported at few points and without any sharp bends. Superior constancy for such coils is reported, but more study of manganin coils is said to be much needed.

W. P. WHITE

A simple check valve. J. F. BREWSTER. *Ind. Eng. Chem.* 15, 32(1923).—The valve, made from materials to be found in a chem. lab., was devised for use with the water vacuum pumps to prevent flooding of app. when a "suck back" occurs.

E. J. C.

Development of the filter press. C. L. BRYDEN. *Chem. Age (N. Y.)* 30, 493-5 (1922).

E. J. C.

New buret holder. SAUER. *Chem.-Ztg.* 46, 998(1922).

E. J. C.

Mechanical appliances for pumping chemical solutions. A. K. FISCHER. *Am. Dyestuff Rep.* 11, 301-6, 339-44, 349-52, 401-4(1922).—An illus. general article.

E. J. C.

A laboratory multiple burner. F. C. VILBRANDT. *Ind. Eng. Chem.* 15, 72(1923).

E. J. C.

A modified steam oven (PERKIN) 25. Apparatus in the Leiden cryogenic laboratory (CROMMELIN) 2.

Volumetric gas-analyzing apparatus. J. W. HOGG. U. S. 1,435,846, Nov. 14. The app. is designed to det. the vol. differences in gases before and after treatment with an absorbing medium. It comprises an absorption chamber, 2 flow meters for differential pressure devices, one measuring the gas before absorption and the other measuring the gas after absorption, and a proportional recording device so connected with, and operated by, the 2 flow meters as to make a visual record which will be proportional to the fraction or % of the original gas absorbed between the 2 flow meters.

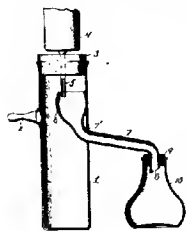
Baffled gas scrubber and fume arrester. E. W. LILJEGREN. U. S. 1,434,301, Oct. 31.

Continuous recording calorimeter. J. AGULLON. U. S. 1,435,783, Nov. 14. The calorific value of gas or other fluid combustibles is detd. by burning within a chamber having thick walls of Cu or other good conductor of heat and measuring the temp. of the walls of the chamber.

Hygrometer. J. LYNN. U. S. 1,435,247, Nov. 14. An indicator pointer is moved over a graduated scale by a pinion and rack connected to an absorption member (which may be formed of basswood) by a "lazy tongs" lever system.

Filter. M. A. MENKE. U. S. 1,434,905, Nov. 7. Wire spacing devices are suspended from the upper edge of a funnel to hold filter paper away from its walls.

Laboratory filtering apparatus. E. C. ABLADIAN. U. S. 1,435,367, Nov. 14. A filtering cylinder (1) is arranged (as at 2) for connection to suction for suction filtration from a Berkefeld filter (4) which is mounted to discharge into a funnel (6) the tube of which extends through the wall of the filtering cylinder and discharges into a flask (10).



Vacuum apparatus for removing gases from liquids. L. D. MILLS. U. S. 1,433,965, Oct. 31. The app. is adapted for sepg. gases from metal-bearing cyanide solns.

Baffled settling chamber for deposition of suspended solids from gases. N. C. CHRISTENSEN. U. S. 1,434,090, Oct. 31. The app. is adapted for recovering cement kiln dust or that in flour mills or other com. establishments.

Apparatus for absorbing and cooling sulfur trioxide or other gases. A. B. JONES. U. S. 1,432,698, Oct. 17.

Apparatus for counter-current washing of finely divided solids. N. C. CHRISTENSEN. U. S. 1,434,089, Oct. 31. Superposed settling chambers discharge one into another. The app. is adapted for treating ore pulps or slimes.

Reverberatory furnace. A. N. JETTE. U. S. 1,435,304, Nov. 14. A cooling coil protects a feed pipe extending through the furnace roof.

2—GENERAL AND PHYSICAL CHEMISTRY

GEORGE L. CLARK

The philosophy of science or the principles of scientific procedure. OLIVER LODGE. *Scientia* 32, 361-76(1922). E. J. C.

New chapters in chemical science. Practical applications and philosophical interest. CH. VANDANGE. *Bull. soc. ind. Rouen* 50, 92-125(1922).—General discussion of the importance of physical chemistry, thermochemistry and chem. mechanics. A. P. C.

What shall be taught in the first year of college chemistry? H. N. HOLMES. *Science* 56, 648-50(1922). E. J. C.

History of chemistry. I. Alchemy and the alchemists. JOHN READ. *Chem. Eng. Mining Rev.* 15, 43(1922). E. J. C.

Scotland's contribution to chemistry. J. C. IRVINE. *Chem. Age (London)* 7, 788-9(1922). E. J. C.

The National Bureau of Standards. R. S. MCBRIDE. *Chem. Met. Eng.* 27, 1159-64(1922).—The organization, functions, personnel, methods and types of work are considered. The relation of industrial research and tech. work to fundamental studies of consts. and research in pure physics is discussed. E. J. C.

Method in research. D. B. KEYES. *Ind. Eng. Chem.* 15, 82-3(1923). E. J. C.
Edison Medal to Millikan. ANON. *Elec. World* 80, 1347(1922).—Brief account of the award of the Edison medal to Robert A. Millikan "for meritorious achievement in electrical science." C. G. F.

Alexander Smith (1865-1922). JAMES KENDALL. *J. Am. Chem. Soc.* 44, *Proc.* 113-7(1922).—An obituary, with portrait. E. J. C.

J. Bredt. P. LIPP. *J. prakt. Chem.* 105, 1-6(1922); portrait.—A tribute on the occasion of the celebration of the 25th anniversary of Bredt's teaching work at the Technische Hochschule zu Aachen. E. J. C.

Ernest Solvay (1836-1922). L. GUILLET. *Rev. metal.* 19, 696-7(1922).—An obituary, with portrait. E. J. C.

Harvey Washington Wiley. W. D. BIGELOW. *Ind. Eng. Chem.* 15, 88(1923).—A brief biography, with portrait. E. J. C.

Louis Pasteur (1822-1895). H. S. VAN KLOOSTER. *Chem. Age* (N. Y.) 30, 479-81(1922). E. J. C.

Louis Pasteur—his contribution to science. I. K. RUSSELL. *Ind. Eng. Chem.* 15, 89-90(1923). E. J. C.

The 150th anniversary of the discovery of oxygen. G. LOCKEMANN. *Z. angew. Chem.* 35, 645-7(1922). E. J. C.

Tables for the microscopic identification of inorganic salts. WILLIAM H. FRY. U. S. Dept. Agr., *Bull.* 1108, 1-21(1922).—A compilation of the optical consts. of 362 inorg. compds. tabulated according to their optical characteristics, and arranged in each class according to index of refraction. W. H. ROSS

Thermal expansion of gelatin gels. ALAN TAFTEL. *J. Chem. Soc.* 121, 1871-84 (1922).—Gelatin gels expand regularly with increasing temp., the expansion curves resembling that of water, but being flatter in proportion to the concn. of the gel; the curves show no sudden inflection as does that of glass below its softening point. The expansion coeffs., and the sp. vols. for any one temp. are linear functions of the concn. of the gel. H-ion does not affect the expansion coeff. Irrespective of diln. 1 g. of gelatin always registers the same contraction at any one temp. This contraction is 0.073 cc. per g. of gelatin at 15°, and 0.065 cc. at 32°, which indicates that only a fraction of the gel water contracts, the wt. percentage being the same for gels up to at least 25%. Gel contraction is not due to filling up pores in solid gelatin by H₂O. The concn./distance between particles curve is an hyperbola, whereas the concn./setting point curve observed by Sheppard and Sweet (*C. A.* 15, 2572) shows a double flexure, the rapid rise at 70 percent concn. being attributed to the fact that the very large mol. forces begin to come into play. Gelatin lowers the temp. of max. density of H₂O by an amt. directly proportional to its concn., expressed as grams of gelatin per 100 g. H₂O. The lowering is shown to be due to the ordinary vol. changes of dry gelatin with changing temp., and the variations in contraction on imbibition of gels with temp. variations. An accurate dilatometer is described, consisting of a bulb closed by a special compression cap and fitted with a fused-on graduated, right-angled, capillary tube terminating in an ordinary tube. Each cm. division of the capillary = 0.0205 cc. \pm . Temp. lag was avoided by heating in steps instead of continuously. Gel concn. was detd. by keeping overnight over P₂O₅, prolonged heating at 100° seeming to cause slow decompn. with loss of wt. The gelatin used was mainly Nelson's Photographic No. 1. (This work should be repeated with ash-free gelatin of known strength and purity. ABSTR.) J. A.

The mutual action of ions. L. MICHAELIS AND H. HIRABAYASHI. *Kolloid-Z.* 30, 209-215(1922).—A study is made of the effect of (1) pure acids, (2) neutral salts in alk. reaction and (3) salts at various p_H -values, on the coagulation of mastic sols. For coagulation of the (electro-negative) sols the anions are not entirely without effect; certain of them (*e. g.*, sulfosalicylic acid) exert a large antagonistic action on the cations. For most anions the sp. differences are so small that in the first approximation of mutual action (*e. g.*, H⁺ and metal cation) the anion effect may be disregarded. This useful approximation confirms the law already established for Congo rubin. It holds for the monovalent alkali ions as well as for Ca⁺⁺. From this method of examn. it also becomes evident that the activity of one univalent and one bivalent ion is not absolute but can only be known with reference to the p_H value, giving with increasing p_H a definite limit. Changing the concn. of H⁺ and OH⁻ has an important effect on the state of the mastic sol only if p_H > about 7-8. HENRY W. BANKS, JR.

Lattice energies and the work of ionization of inorganic compounds. H. G. GRIMM. *Z. physik. Chem.* 102, 504-6(1922); cf. *C. A.* 16, 4130.—Numerous corrections of the data given in the earlier paper. H. JERMAIN CREIGHTON

Chemical kinetics of heterogeneous systems. IV. Chemical reactions involved in dissolution of noble metals in cyanides. EICHI YAMAZAKI. *J. Chem. Soc. Japan* 43, 686-90(1922); cf. *C. A.* 16, 3569.—Bodländer (*Z. anorg. Chem.* 19, 583(1892)) found that when Au dissolves in cyanides, H_2O_2 is formed which further accelerates dissoln., and that a large amt. of peroxide can be isolated by adding Ca and Ba salts. According to B.'s equation, the reaction ought to be a monomol. reaction. Y. reported elsewhere (cf. *C. A.* 16, 3569), that the velocity of this reaction is proportional to sq. root of the concn. of O_2 . In the case of Ag, the reaction probably goes as follows: $Ag = Ag^+ + (-)$, $O + 2(-) = O^{--}$, $H_2O + O^{--} = 2OH^-$; or $2Ag + H_2O + \frac{1}{2}O_2 = 2Ag^+ + 2OH^-$. However, like all other oxidative reactions, H_2O_2 is always present as by-product and the formation of this by-product will be greatly accelerated if alkaline earth metals are present. S. T.

Apparatus and methods in the Leiden cryogenic laboratory. C. A. CROMMELIN. *Trans. Faraday Soc.* (advance proof) 1922.—A general outline of the app. and methods used to produce any temp. below zero degrees for accurate phys. measurements at these temps. Pressures of 1 atm. or lower are used as the construction of cryostats for higher pressures is difficult and even dangerous. A table shows the b. p., triple point temp., triple point pressure in cm., crit. temp., and crit. pressure in atm. Ranges of temps. from -24° to -218° , from -253° to -259° , and from -269° to -272° are attainable by baths of liquefied gases. The different methods of liquefying the various gases are discussed, also means of purification. Attention is directed rather toward the possibility of detg. accurately phys. consts. at these low temps. than to the liquefying app. Cryostats have been constructed with a constancy of 0.01° . One used at Leiden for universal application with the exception of Ne and He is described and illustrated. He and Ne cryostats are in principle similar to the above app. though differing in arrangement. They are connected immediately to their liquefiers so that the liquid flows from the liquefier through a vacuum tube into the cryostat. W. H. B.

Thermometric lag with especial reference to cold-storage practice. EZER GRIF-FITHS AND J. H. AWBERRY. *Trans. Faraday Soc.* (advance proof) 1922; *Engineering* 114, 508(1922).—Expts. conducted to obtain data as to the magnitude of some possible sources of error in measurements when Hg or spirit thermometers are employed for taking temps. of the atm. of a ship's hold by withdrawal of the thermometer to the deck for reading. Information is included as to the error introduced by the "time lag" of the thermometer if the temp. of the hold is rapidly changing. The app. for detg. the relative lags of the different types is described and the type of curves is indicated by plotting the temp. above surroundings as abscissas and the time in min. as ordinates. As these curves are exponential in character the observations may be shown graphically on a series of straight lines by plotting the logarithm of the temp. excess against the time. The slope of these lines detcs. relative "time lag." Values (in min.) for the various types of thermometers were: plain Hg, 3.38; spirit, 6.11; wood-cased Hg, 14.57; direct reading Pt, 17.29; Hg in steel, distant reading type, 18.28. A table, calcd. from these figures, shows the errors introduced in detg. the temp. of an enclosure if the thermometer is first brought to a place where the temp. differs from that of the enclosure by N° and is held there t sec. before reading. Examples are given of the use of the figures under various conditions and with different types of thermometers. W. H. B.

Thermochemistry of the carbon compounds. An addendum. A. THIEL. *Ber.* 55B, 2844-5(1922); cf. *C. A.* 14, 1623, 3086; 15, 791.—T. repeats in simpler form several objections to Fajan's reasoning. W. P. WHITE

Comments on the paper of A. von Weinberg: "Heat of combustion and work of dissociation." WALTER HÜCKEL. *Ber.* 55B, 2839-43(1922); cf. *C. A.* 14, 1332; 15, 73.—H. finds at least 6 blunders, contradictions, or similar errors in v. W.'s paper. W. P. WHITE

The new heat theorem of Nernst. SCHMOLKE. *Arch. Wärmewirtschaft* 3, 165-9 (1922).—A simple explanation of the theorem, with illustrations of its use in solving problems connected with combustion. ERNEST W. THIELS

An alignment chart for thermodynamical problems. C. R. G. COSENS. *Proc. Cambridge Phil. Soc.* 21, 228-30 (1922). E. J. C.

The variation of the index of refraction of water, ethyl alcohol, and carbon disulfide with the temperature. E. E. HALL AND A. R. PAYNE. *Phys. Rev.* 20, 249-58 (1922).—The observations were made with a new, carefully built refractometer. Two prisms were used, one of 60° and the other of 75°. The temp. was controlled and measured within 0.1°. For H₂O, 6 or 7 readings were made at each of 34 different temps. between 16° and 98.4°. When reduced to vacuum the n values for pure gas-free H₂O are well represented by the empirical formula: $n = 1.33401 - 10^{-7} (66t + 26.2t^2 - 0.1817t^3 + 0.000755t^4)$. The temp. coeff. dn/dt changes from -8×10^{-6} at 15°, to -30×10^{-6} at 100°. Kahlbaum's EtOH (99.8% abs.), and Baker's c. p. CS₂ were used without further purification. Detns. of n for EtOH were made at 50 different temps. between 15° and 75°; and for CS₂ at 43 different temps. between 15.95° and 44.7°. The tables of data given were read at intervals of 2° from a large scale plot of the observed data. The results correspond to the equations: n (for EtOH, 15° to 70°) = $1.36250 - 10^{-6} [404 + 0.44(t - 15) + 0.0075(t - 15)^2]$; n (for CS₂, 15° to 45°) = $1.62935 - 10^{-6} [766 + 5.12(t - 15) - 0.105(t - 15)^2]$. These values for abs. index of refraction for the EtOH and for the CS₂ may be different from the true values, due to the slight amt. of impurities present. The change of the index with temp. is not believed to be affected to a large extent. F. E. BROWN

The Hall, Ettingshausen, Nernst and Leduc effects in cadmium, nickel and zinc. A. E. CASWELL. *Phys. Rev.* 20, 280-2 (1922).—The 4 effects were measured on the same sample of each element, because these properties seem to vary in different specimens of the same element. Kahlbaums c. p. metals were used in rolled strips 0.01035 cm. in thickness and 1.2 cm. in breadth. R , P , Q , and S are, resp., the coeffs. of the Hall, Ettingshausen, Nernst and Leduc effects. For Cd, R at 42.0° = 8.50×10^{-11} ; R at 49.3° = 11.67×10^{-11} ; P at 51.2° = 5.96×10^{-12} ; Q at 39.4° = 0; S at 39.4° = -1.87×10^{-7} . For Ni, R at 57.2° = 770.7×10^{-11} ; P at 55.8° = 3.67×10^{-12} ; Q at -11.4° = 8.36×10^{-12} ; Q at 37.6° = 27.47×10^{-12} ; S at -11.8° = 0; S at 38.9° = -10.17×10^{-7} . For Zn, $R \times 10^{11}$ at -24.7° = 15.33, at 25.5° = 8.20, at 32.6° = 8.38, at 39.9° = 8.18, at 41.2° = 8.23, at 76.7° = 9.82; $P \times 10^8$ at 17.1° = 0, at 45.2° = 1.76, at 60.7° = 2.27, at 76.7° = 3.02; $Q \times 10^{12}$ at -16.2° = 290.0, at 37.2° = -6.25; $S \times 10^7$ at -16.2° = 37.59, at 37.2° = 4.00. F. E. BROWN

Passive state of metals. EIICHI YAMAZAKI. *J. Chem. Soc. Japan* 43, 665-81 (1922).—A theoretical paper. Theories of Faraday, Hittorf, Fredenhagen, Finkelstein and Müller, and Bennett and Burnham are first considered. The passive state of metals, produced either by oxidizing agents or by other means such as heat, is a physico-chem. condition, not an independent state of the metal. This condition is produced by loss of surface electrons, resulting in shrinkage of an electronic orbit, with the consequent increase in their electromagnetic resistance. Such change in the orbit should change the soly. of the metal and other physical properties. The electrons, the loss of which produces the passive state of metals, are not valence electrons, but are similar to those which are affected by photo-elec. effect. S. T.

Heat flow in a finite cylinder having variable surface temperature. GEO. E. THOMPSON. *Phys. Rev.* 20, 601-6 (1922). E. J. C.

A method of maintaining small objects at any temperature between -180° and +20°. P. P. CIOFFI AND L. S. TAYLOR. *J. Optical Soc. Am.* 6, 906-9 (1922).—"The method consists in surrounding the object to be cooled by a stream of cold dry air,"

"obtained by evaporating liquid air in a Dewar flask by an elec. heater." "The cold air is forced by the pressure thus created past the substance under examn., through a vacuum heat-insulated delivery tube." The stream may be made to flow more continuously past the object by applying suction beyond it. The rate of heating determines the flow of air, and hence the degree of cold maintained. Other details are given.

W. P. WHITE

Physical chemistry in industry (Tour) 13. The effect of dissolved substances on the deposition of colloidal particles from a solution by means of an electric current (KLEEMAN) 4.

3—SUBATOMIC PHENOMENA AND RADIOCHEMISTRY

S. C. LIND

Atoms and their spectra. STEPHEN MAILL. *Chem. Age* (London) 7, 446-9 (1922).—A review of the light thrown on at. structure by a study of X-ray and other spectra.

F. O. A.

Trend of modern physics and ideas of the structure of matter. C. E. GUYE. *Arch. sci. phys. nat.* 4, 269-96 (1922).—A review summarizing in non-mathematical form the effect of the relativity and quantum theories on modern physics. Modern views of at. structure are briefly presented.

W. ALBERT NOYES, JR.

The fine structure of atomic nuclei and the variation from Coulomb's law inside the nucleus. I. The atomic nuclei of lithium and isohelium. M. C. NEUBERGER. *Ann. Physik* 68, 574-82 (1922).—The deviation from Coulomb's law is very slight for nuclei of higher charge than 2, e. g., Li_4 . The upper limits of the nuclear radii are 2.53×10^{-13} for Li_4 and 1.45×10^{-13} cm. for He. The nucleus of B_4 , which Aston failed to discover, is shown to be unstable.

F. O. A.

Electronic structure of atoms. M. L. HUGGINS. *J. Phys. Chem.* 26, 601-25 (1922); cf. C. A. 16, 3532, 2067.—An elaboration of ideas presented in previous papers. It is postulated that the force of repulsion between 2 electrons passes through a max. when the distance is approx. 1 Å. For shorter distances the repulsion may or may not change to an attraction. Existence of electron doublets and triplets is explained on this basis. The following system of notation is suggested to show the electrons in the various shells: the at. no. is placed in parentheses followed by the no. of single electrons, doublets or triplets, the no. of each shell being enclosed in a sep. parenthesis. Thus Rb would be (+37)(2×1)(6×3)(8×2)(1), indicating at. no. 37, 2 electrons in first shell, 6 triplets in the second, etc. This system is extended to compds. Structures of various atoms are given with variations accompanying change in valence. Periodic relations are pointed out.

W. ALBERT NOYES, JR.

The controversy over the electron. Remarks on a paper by R. Bär. F. EHRENHAF. *Naturwissenschaften* 10, 980-2 (1922).—Certain points are criticized in a recent review by Bär (cf. C. A. 16, 2635).

C. C. DAVIS

A possible reconciliation of the atomic models of Bohr and of Lewis and Langmuir. W. HUGGINS. *Nature* 110, 37-8 (1922).—According to the theory of relativity it is immaterial whether the electrons of any given atom are regarded as describing orbits around a fixed nucleus or the nucleus is regarded as rotating inside the electron shell or shells with each electron fixed relatively to the others. If it is assumed that the electron shells are fixed and the nucleus rotates on an axis, a model is obtained which when viewed with respect to the electron shells is precisely the same as the Lewis-Langmuir model, and furthermore with respect to the whole atom it possesses all the merits of Bohr's model. The proposed model possesses the further merit that the existence of

isotopes can be predicted by its aid, for if the nucleus of a given atom possesses more than one stable axis of rotation with respect to itself or to its surrounding shells of electrons, or to both, and these axes are associated with different amts. of energy, it is possible for the mass of the atom to be different from the different positions of the nuclear axis, since by the theory of relativity energy possesses mass. W. H. R.

The model of the hydrogen molecule-ion. W. PAULI, JR. *Ann. Physik* 68, 177-240(1922).—Canal rays show the existence of H_2^+ . Three different classes of arrangement are possible for 2 + kernels with 1 - charge. In the 1st class, the orbit of the electron lies in a plane perpendicular to the middle point of the line joining the two kernels. In the 2nd class, the orbit of the electron is sym. to this plane. In the 3rd class, the orbit is entirely on one side of this plane. The 1st class is unstable: the 2nd stable: the stability of the 3rd has not been calcd. Even the 2nd class is metastable, for H_2^+ decomposes into $H + H^+$ with evolution of energy. The orbit of least energy is a zone of a definite ellipsoid of rotation. The paper is mathematical but discussions of the applicability of the quantum theory and various mech. principles are given. F. E. BROWN

Mathematics of the dicyclic color theory, and a new theory of the structure of the nitrogen atom. JAMES MOIR. *J. Chem. Soc.* 121, 1808-13(1922).—Previously (C. A. 16, 89) the hypothesis was put forward that the cause of color in dicyclic substances is the performance of an oval orbit by an electron going around the whole mol. The time of revolution of an electron is supposed to be identical with the time for light to travel one wave length. A mathematical investigation by Roscvarc shows that using the ordinary laws of dynamics an electron attracted by 2 equal positive nuclei can describe an elliptical orbit having its foci at the nuclei. A formula for the periodic time gives this quantity as proportional to the $2/3$ power of the length of the major axis of the ellipse. In the paper quoted, the linkage factors for methylene-, imino-, oxo-, and thio-groups are 0.68, 0.78, 0.891 and 0.92, resp., values which are in the ratio of the periodic times. The ratios of the major axes of the ellipses are the $2/3$ root of the linkage factors: 0.750, 0.847, 0.926 and 0.946 and the major axis of an orbit around 2 phenoxide rings is taken as unity (vibration $\lambda 1380$). These values are divided by 0.926, which is the ratio of the size of the mol. of dihydroxyphenyl ether to the size of 2 juxtaposed mols. of phenol and represents the contraction on replacing 2 para-H atoms by the oxo-linkage. The sizes of the ellipses are then 0.810, 0.915, 1.000, 1.021. The suggested explanation of these figures is (1) that the oxo-molecule is in a straight line ($A-C_6H_4-O-C_6H_4-A'$); (2) that in the methylene compd. the bonds connecting the 2 rings to the methylene C lie at the angle 109.4° of the C tetrahedron; (3) that in the imino compd. the angle is 133° for the chief absorption band and 120° and 107° for the subsidiary bands. Thus the valences of N are not symmetrically arranged around the atom. J. M. B.

The difference between series spectra of isotopes. J. W. NICHOLSON. *Nature* 110, 37(1922).—The differences in the spectra of the Li isotopes as reported by McLennan are 3 times as great as those calcd. by Bohr's theory. The quantum theory is unable to explain this large sepn. and it is suggested that the new series may be a combination series or a spark series. In an investigation on some of the simpler possible orbits in a Li atom with only 2 electrons, a specially simple class of orbits was found, and the results gave, as the principal spark-line of Li, a value very close to $\lambda 6708$, the red line shown in the ordinary spectrum. When there are many electrons in an atom, a ratio roughly of order $1/11$ appears to exist between the orbital radii of the 2 outer consecutive electrons. An immediate consequence is that the Bohr formula would never be very far wrong in its use for a rough detn. of the sepn. to be looked for in the spectra of isotopes. W. H. ROSS

The loss of energy of an α -ray beam in its passage through matter. I. Passage

through air and carbon dioxide. P. L. KAPITZA. *Proc. Roy. Soc. (London)* **102A**, 48-71(1922).—The construction of a sensitive *radiomicrometer*, and its application to the measurement of the distribution of energy in an α -ray beam are described in great detail. With this app., consisting essentially of a loop of wire of high cond. terminated at 1 end by a thermocouple, and suspended by means of a quartz fiber in a magnetic field, the energy distribution of an α -ray beam in its passage through air and CO_2 was detd. and it is shown that the same law governs the distribution in the 2 gases. Immediately beyond the range, the α -particles have an energy not greater than 0.7% of the initial energy. When the energy distribution curves are compared with those obtained from the ordinary ionization curve, it is found that the α -particles with high velocities on an av. expend more energy in the production of an ion than those moving with low velocities. Again when the energy distribution curves are compared with those obtained from the measurement of the velocities of α -particles by deflection in a magnetic field, it is found that up to a range of 6 cm. the curves are in good agreement, but beyond that point the energy distribution curves give distinctly smaller values. Explanation of this discrepancy may be found in increased scattering towards the end of the range, the lack of homogeneity in the beam, or in the fact that some of the α -particles are singly charged. The beating effect of the β -rays was detected and by means of a modified app. the energy absorption curve in Al was detd. The heating produced in CO_2 over different positions of the range was measured and curves very similar to ordinary ionization curves were obtained.

G. L. CLARK

Some peculiarities of the Wilson ionization tracks and a suggested explanation. J. L. GLASSON. *Proc. Cambridge Phil. Soc.* **21**, 7-10(1922).—Five phenomena observed in the photographic work of Wilson (cf. *C. A.* **7**, 932, 1661, 2157) are discussed. (1) *β -Ray tracks.*—The paths of β -rays describe arcs which cannot be explained by cumulative deflections. Assuming that a uniform magnetic field exists, and that the deviations from at. collisions are very minute, the perfection of the circular arcs actually found can be explained. The electron thus moves in a circle not because of collisions but in spite of them. This field must be several hundred Gauss units, extend over approx. 1 sq. cm., last at least 10^{-10} sec., arise within the gas itself and be produced by transient cryst. forms. (2) *Parallel tracks.*—If this magnetic field exists, β -rays on entering the field should describe parallel tracks. This is verified by examples. (3) *Periodicity of the ions.*—The distribution of ions along a single track is evidence of the periodicity in the mol. arrangement, and the distance between groups would depend upon the distance between successive layers of cryst. forms. (4) *Curvature of α -ray tracks.*—Calcns. give a field strength of several hundred Gauss units to account for the radius of curvature of α -rays. (5) *Emanation α -ray curves.*—The tendency for α -rays to point in definite directions is very marked, and quadrants occur in which very few rays are projected. It is concluded that the atoms of Ra Em are polar and that the field is polarized. (1) and (2) are assumed to be obvious, but (3), (4) and (5) were observed only by the aid of the proposed theory. In combination, these form a strong basis for the hypothesis that gaseous cryst. forms exist. These H_2O aggregates are probably not amorphous because of the polar nature of the H_2O mol.

C. C. DAVIS

The blackening law for α - and β -rays. HILDE SALBACH. *Z. Physik* **11**, 107-28 (1922).—With α -rays from Po the blackening of a plate is proportional to the number of particles struck by the rays. Two preps. were used and expts. were carried out with a tube photometer for Agfa extra-rapid and Schleussner-Röntgen plates as well as with the photomechanical plates of Jahr. In the Schwarzschild equation g , the exponent, is, therefore, for α -rays from Po almost unity. With β -rays from U X the exponent assumes values as if they had been observed only with very strong light sources and momentary exposures; i. e., a given blackening was obtained more easily with a low β -

radiation density than with a high density and correspondingly shorter exposure. A series of absorption measurements was made photographically with Al and it was established that the different kinds of plates respond best to rays of different hardnesses. This means that the photographic method for detn. of absorption coeffs. would not be exact for a mixed ray such as is given by U X. The exponent in the blackening law is the same for rays of differing degrees of absorption.

F. O. A.

The scattering of β -rays. H. A. WILSON. *Proc. Roy. Soc. (London)* 102A, 9–20 (1922).—Crowther and Schonland (*C. A.* 16, 1535) regarded their own expts. as decisively in favor of the theory of "single scattering" or the deflection of each β -ray by a single collision with an atom. New calcns. from these data with the "multiple scattering" theory of J. J. Thomson show better agreement with expt. Since Thomson derived the multiple scattering formula $I/I_0 = 1 - e^{-k^2/kt}$ (where I/I_0 is the fraction of the β -rays remaining inside a scattering angle ϕ after passing through a plate of thickness t , and kt is the av. value of the sum of the squares of all the deflections of a β -ray) upon the assumption that an atom consists of a solid sphere of positive electricity inside of which negative electrons move about, new calcns. are made assuming each atom to consist of a positive nucleus surrounded by a hollow sphere of negative electricity. This modified theory clearly agrees more closely with the scattering observed by Crowther and Schonland than the single scattering theory, although the latter is certainly correct for very thin plates and large scattering angles. With thicknesses above 10^{-4} cm. the multiple scattering greatly predominates.

G. L. CLARK

Polonium hydride. II. FRITZ PANETH AND A. JOHANNSEN. *Ber.* 55B, 2622–37 (1922); cf. *C. A.* 13, 1430.—Po was electrolytically deposited from a $\text{Pb}(\text{NO}_3)_2$ soln. contg. Ra D. With an acid concn. of 0.1 *N* and $1-2 \times 10^{-4}$ amp. per sq. cm. Pb, Ra D and Ra E remain in soln. and pure Po deposits. As cathode a thin Pt foil was used and Po deposited on the small (2 cm. by 1 mm.) middle portion. This foil was suspended in a glass shell of which the bottom and walls were covered with a thin layer of Mg powder and the foil heated to bright yellow for a few seconds by a current of 5–6 amp., in an evacuated desiccator. Most of the Po distd. to the Mg which could then be mixed and used in aliquot portions. As the yield of hydride is very poor, most of the Po is with Mg in the acid soln. of the latter. For its recovery the walls and cover of the desiccator were washed with HCl and this and the MgCl_2 soln. were several times evapd. with HNO_3 , the residue taken up with concd. HNO_3 and dild. with 8 pts. water, 10–20 mg. PbO added and the soln. electrolyzed with Pt foil electrodes, cathode bright, anode dull. All Po deposits with PbO_2 on the anode; these are dissolved by HNO_3 , the soln. evapd. to crystn., diluted and Po deposited on the small foil as before. About 10^{-9} g. of Po was used and for comparison, as in the earlier expts., about 10^{-12} g. of Th B and 10^{-13} g. of Th C. The yield in hydride was $2-5 \cdot 10^{-4}$ of the original activity in all cases. Measurement of the hydride was by decompn. in Marsh tubes and electroscopic measurements, as described previously. It is more volatile than BiH_3 and the tube must be heated in two places. The method of spark-electrolysis gave very good yields of hydrides with Po, Th B and Th C. Po hydride could be condensed with liquid air and revolatilized, thus giving definite proof of its gaseous nature. P_2O_5 was found to decomp. both Po and Th C hydrides almost completely; CaCl_2 decomposes Po considerably although much less than P_2O_5 but acts only a little on Th C hydride. AgNO_3 0.1 *N* decomposes over 95% of both Po and Th C hydrides; 0.1 *N* NaOH decomposes 31% of Po and 71% of Th C hydrides. Water contg. air decomposes Po but not Th C hydrides. Expts. to det. the rate of spontaneous decompn. indicated that Po hydride is 50% decompd. in about 4 min., Th C hydride in about 25 min. Po hydride is much less stable than BiH_3 and TeH_2 , which hydrides it most resembles.

A. R. MIDDLETON

A low voltage cathode ray oscillograph. J. B. JOHNSON. *J. Optical Soc. Am.* 6,

701-12(1922).—In the older form of Braun tubes the electron stream is produced by a high voltage discharge through the residual gas in the tubes. This requires a potential from 10,000 to 50,000 v. In this cathode ray oscillograph a Wehnelt cathode is used as the source of electrons, so that the lower limit of voltage is detd. by the effect of the electrons on the fluorescent screen and not by the voltage needed to produce the electrons. In this way tubes are obtained which operate at 300 or 400 v. By introducing a small amt. of gas into the tube at a pressure of a few thousandths of a mm. Hg the electron stream is focused on the fluorescent screen. The sharpness of the spot on the screen is also controlled by the temp. of the cathode. Arcing and injurious effects of positive ion bombardment are prevented by making the vol. of gas surrounding the electrodes very small. The tube is provided with 2 orthogonal pairs of plates for electrostatic and magnetic deflections. A difference of potential of 1 v. at the plates deflects the spot about 1 mm. When magnetic deflections are used a pair of coils 4 cm. in diam. produces a deflection of 1 mm. per amp.-turn. The fluorescent screen consists of equal parts of CaWO_4 and Zn silicate, especially prepd. for fluorescence. The tube finds application in the study of the behavior of vacuum tubes, relay, and other kinds of app. at low and high frequencies. A. W. SMITH

The relation between the evolution of heat and the supply of energy during the passage of an electric discharge through hydrogen. J. K. ROBERTS. *Proc. Roy. Soc. (London)* 102A, 72-88(1922).—Measurements of the heat evolved by the passage of a known current under a known potential through a H discharge tube were made in order to test the hypothesis that a much closer combination between an electron and a H nucleus than that existing in the H atom might occur. The decrease in mass and energy evolution consequent from the whole-no. rule, as well as the fact that the giant stars radiate more energy than can be accounted for by the loss of gravitational potential energy by contraction, point to such a close combination. The high-temp. conditions in a star enabling violent collisions between electrons and H nuclei also occur in a H discharge tube. If the close combination does occur more heat should be evolved than can be accounted for by the supply of elec. energy. A discharge tube was placed in a calorimeter and a comparison made between the heat produced and the energy supplied. The 2 quantities agreed to less than 1/5% and within exptl. error. It is possible that the excess energy may have been liberated as a penetrating γ -radiation. G. L. C.

The phenomena at the cathode of the mercury vapor arc. A. GÜNTHER-SCHULZE. *Z. Physik* 11, 75-87(1922).—The heat conducted away from the cathode surface by Hg is 51% of the energy of the cathode drop. The surface area of the cathode is 2.5×10^{-4} cm.² per amp. Radiation from the surface is slight. The Hg vaporized is 7.2 mg. per coulomb, requiring 2.2 watt-secs. The Hg ion carried to the cathode is 2.08 mg. per coulomb. The total energy loss at the cathode surface lies between 4.92 and 4.99 watt-secs.; Stark (*Ann. Physik* 18, 213(1905)) gives 5.27 ± 0.09 watt-secs. This means that but few electrons leave the cathode. Some are, however, required to ionize the Hg. But because of the high temp. and large amt. of radiation the Hg must be in a very easily ionizable condition. The pressure at the surface is about 2 atms.; immediately above, it is about 0.26 atms. F. O. A.

Production of an electromotive force on enclosed circuit by a light effect on argentite. H. H. SHELTON AND P. H. GRIGER. *Proc. Nat. Acad. Sci.* 8, 161-3(1922).—When the contact between a Cu strip and an argentite crystal was illuminated an e. m. f. was set up which varied with the intensity of the illumination and was not due either to heat effect or pressure upon the contact. The phenomenon does not seem to be similar to what is commonly known as the photoelec. effect. More work is in progress. C. R. PARK

Reflection of X-rays from calcite. BERGEN DAVIS AND W. M. STIMPEL. *Phys. Rev.* 17, 526-7(1921); cf. following abstr. D. MACRAE

Experimental study of the reflection of X-rays from calcite. BERGEN DAVIS AND W. M. STREMPER. *Phys. Rev.* 17, 608-23(1921).—A narrow beam of general radiation fell at an angle upon a crystal (*A*) and the reflected beam was allowed to fall upon a second crystal (*B*). The intensity of the beam from *B* was then compared with the direct beam from *A*. Percentage reflection was found surprisingly large when the surfaces of the 2 crystals were strictly parallel. It is a function of wave length, but is less so the more nearly perfect the crystal. It would seem that the reflection from a perfect crystal would be independent of wave length and would probably be greater than 50%.

D. MACRAE

The extension of the X-ray into the ultra-violet spectrum. OTTO STUHLMAN, JR. *Science* 56, 344(1922).—When thermions liberated from a W filament are accelerated and allowed to impinge on a metal grid, secondary electrons are emitted from the grid, the no. of which may be measured by means of a galvanometer in series with the grid and a plate at a const. positive satn. potential. Wave lengths corresponding to changes in the slope of the curve for the secondary current plotted against the accelerating voltage are calcd. by the quantum-energy expression $Ve = hc/\lambda$. Preliminary results for W and Fe are given. Apparently the convergence wave length (when the ratio of the no. of secondary electrons per primary is 3) for W ends at 91.2 Å. and is followed by an absorption band extending down to 14 Å. This is then followed by the *Ma* line, here extrapolated as 7.04 Å. (by X-ray data 7.007 Å.).

G. L. C.

Sensitized Röntgen plates. C. A. SCHLEUSSNER. *Umschau* 26, 561-5(1922).—The principle of sensitizing photographic plates for radiological purposes by rendering them susceptible to the action of secondary rays is discussed in general fashion. Certain org. salts, not named, are impregnated in the AgBr emulsion and are adsorbed, thus acting in a sense in the same way as colored dyes to the action of ordinary light on plates.

G. L. CLARK

Distribution of intensity of the γ -rays of radioactive substances in absorbing mediums. W. FRIEDRICH AND O. GLASSER. *Z. Physik* 11, 93-106(1922).—Measurements were made by the ionization method of surface of equal potential about radioactive preps. The intersections of these planes with planes passing through the long axes of the preps. give curves called "isodoses." Isodoses were detd. for several arrangements of preps.

F. O. A.

Radiative equilibrium, the insolation of an atmosphere. E. A. MILNE. *Phil. Mag.* 44, 872-96(1922).—A theoretical consideration of the equil. existing in any atm. Two shells are assumed, an inner one, the troposphere in convective equil., and an outer isothermal one, the stratosphere, which can be in strict radiative equil. only when certain conditions prevail which are discussed at length. In an application to the earth's atm. it is inferred that the variation in temp. of the stratosphere with latitude cannot be accounted for on radiative principles unless the total radiation to space is greater in high than in low latitudes, which is probably the case; and the observed distribution of stratospheric temp. is probably connected with the general circulation of the air.

S. C. L.

The absorption of λ 5460.97 Å. by luminous mercury vapor. J. C. McLENNAN, D. S. AINSLIE AND (MISS) F. M. CALE. *Proc. Roy. Soc. (London)* 102A, 33-45(1922).—When the radiation constituting the green line of Hg, which is known to be produced by 12 separable wave lengths, is passed through moderately luminous Hg vapor, the main component and the components no. 1, $\Delta\lambda = 0.0086$ Å., and no. —1, $\Delta\lambda = -0.0087$ Å., are strongly absorbed. Under the exptl. conditions described there were no reversals of any of the other satellites. Of the 9 members constituting the magnetically resolved green line, only the central undisplaced member is markedly absorbed by luminous vapor. The 3 components above mentioned which are completely absorbed by lum-

inous vapor may originate in different isotopes of Hg. The O component would naturally be associated with isotope 200, and the components $\Delta\lambda = -0.0087 \text{ \AA}$. and $\Delta\lambda = 0.0086 \text{ \AA}$. with isotopes 202 and 198, resp. Upon the Bohr theory the max. sepn. of the wave lengths in this region arising from the isotopes of Hg is $0.000547 \times 10^{-1} \text{ cm}$, or $1/11$ of the actual sepn. of either of the satellites +1 and -1 from the 0 central component. In some expts. with Li, however, it was found that the red line consists of 2 doublets with a sepn. 3 and 4 times that calcd. from the Bohr theory. Hence it would seem that the observable spectral displacements for isotopes should be given by the at. no. times the displacement on the Bohr theory. When the Hg displacements are multiplied by 80, approx. agreement with the position of the various components is found. No satellite for isotope 199 was found, in agreement with Aston's failure definitely to establish its existence. G. L. CLARK

A sodium-potassium vapor arc lamp. F. H. NEWMAN. *Phil. Mag.* 44, 944-8 (1922).—A quartz lamp consists of two bulbs, 3 cm. in diam., each contg. an Fe rod electrode 4 mm. in diam., sealed in with sealing wax at the lower ends of long quartz tubes. The two bulbs are connected dumb-bell fashion by a quartz tube 15 mm. long and 5 mm. diam. The liquid alloy of 2 parts Na and 1 part K by wt. is introduced through the outlet tube from one bulb, which is then attached to a pump by a rubber connection. After evacuation the lamp is sealed off and put into operation by passing elec. discharge through the bulb contg. alloy, making it the cathode. By tilting, some of the alloy flows into the other bulb. The lamp operates with d. c. of 1.5 amps. at 10 v. drop. 30-200 v. are required for starting. No external heating is necessary. A. c. current cannot be used. The principal line is the Na D line. The K lines are very faint under all conditions. The ionization phenomena are discussed. The current must not be increased to a point that endangers the sealing-wax joints. Below 2.5 amp. no brown color is produced in the silica; above this the usual brown color appears. S. C. LIND

Negative optical anomalies. GERVAISE LE BAS. *Chem. News* 123, 271-2 (1921).—A study of the optical anomalies of some thiophene derivs. in such a way as to distinguish between the 2 sides of conjugated unsatd. groups, makes it necessary to recognize electrons as the units which retard the light, but that in some cases they fail to do so. With these thiophene derivs. it was found that: substitution $\alpha 2$ in position 3 can reduce the negative anomaly to 0; substitution on both sides of the S atom practically neutralizes the negative anomaly; the full substitution of one ethenoid group or substitution on one side of the mol. reduces the negative anomaly to half; Cl and Br have lost their usual positive anomalies for substitution. G. W. STRATTON

The absorption spectra of phenylazophenol and its derivatives. ALPHEUS W. SMITH AND C. E. BOORD. *J. Am. Chem. Soc.* 44, 1449-55 (1922).—The absorption spectra of *p*- $\text{MeC}_6\text{H}_4\text{N}_2\text{C}_6\text{H}_4\text{OH}$ and its Na, K and Ba salts in 0.0002 *M* solns. show that the band is shifted toward the red end of the spectrum in the salts, the shift being greatest with the Na salt and least with Ba. With 0.001 *M* solns. of $\text{PhN}_2\text{C}_6\text{H}_4\text{OH}$ and its Na salt and hydrochloride the sbifting is also toward the red end, being greater with the hydrochloride than with the Na salt. Shifting of the band in the same direction occurs with 0.0002 *M* solns. of the alkali salts of the isomeric chloro and nitrophenylazophenols. With the isomers themselves in these dilns. the order of absorption is $p > m > o$ except for the nitro derivs, when it is $p > o > m$. The absorption spectra are discussed in terms of McClelland's mutual induction theory of light absorption. G. W. S.

Some spectrum lines of neutral helium derived theoretically. L. SILBERSTEIN. *Nature* 110, 247-9 (1922); cf. *C. A.* 17, 238.—In explanation of the spectrum of the neutral He atom which contains some 105 lines none of which has been accounted for theoretically, it may be suggested that the nucleus and the 2 electrons are always col-

linear with each other, the latter describing 2 equal and oppositely situated ellipses round the former, but the corresponding formula does not cover a single observed line of He. If it be assumed, on the other hand, that the mutual perturbation of the 2 electrons is negligible, then a spectrum formula is obtained which covers about 40 lines of the spectrum of neutral He and will probably be found to cover 50 more lines. It is therefore concluded that the electrons within the atom do not repel each other even with a small fraction of the force usually attributed to them; and that the field of force of a bound electron is probably entirely engaged by the nucleus, at least in the case of He and possibly also of Li and other higher atoms.

W. H. Ross

Spectrum lines of neutral helium. W. M. HICKS. *Nature* 110, 309(1922).—The constitution of the secondary spectrum of H may be developed by a method similar to, but more generalized, than that used by Silherstein (preceding abstr.) for He. Practically the whole of this spectrum depends on the sequence of the Balmer series. The spectrum is a kind of linkage spectrum in which the usual links are replaced by the septs. between the successive lines of the primary, viz., 5331.57, 2467.75, etc. The existence of these linkage spectra forms a difficulty in the orbital theory of spectral lines. According to Silherstein's theory, and apparently in any orbit theory, the 2 electrons are moving independently and each passes between 2 of its corresponding paths. But if the combined change of energy is radiated these 2 events must be absolutely simultaneous.

W. H. Ross

The spectrum of helium in the extreme ultra-violet. THEODORE LYMAN. *Nature* 278-9(1922).—With an improved vacuum spectroscope the line 584.4 in the ultra-violet spectrum of He was observed to be of very great strength and accompanied by 3 new lines at 537.1, 522.3 and 515.7, the intensities of which decrease with their wave length and in a manner strongly suggesting a series relation. The spacing of these 4 He lines on the frequency scale is identical with the spacing of the first 4 lines in the singlet principal series. The line 584 is regarded as the first member of a principal series represented by $(nS - mP)$. The values given for the wave lengths of the 4 He lines are probably correct to 0.1-0.2 of a unit, but it is pointed out that these wave lengths are not in complete agreement with the accepted values of the resonance and ionization potentials.

W. H. Ross

Spectrum of the night sky. RAYLEIGH. *Nature* 110, 769(1922). E. J. C.

Absorption of light by sulfur at various temperatures. M. FUKUDA. *Chem. News* 125, 209-11(1922).—See C. A. 16, 4137. E. J. C.

Absorption of potassium vapor in the associated series. A. L. NARAYANA AND D. GUNNAIYA. *Nature* 110, 250(1922).—Traces of absorption of K vapor in the associated series have been found at about 1100°. Distinct traces of absorption have also been detected in the diffuse series; the bands 5780, 5340, 5300 and 5100 apparently corresponding to 5782, 5340, 5323 and 5100 of $(2p - md)$. The well developed dark line 4640 previously noted at 900° has been confirmed to be the combination line $(1s - 2d)$ recently observed by Datta (C. A. 15, 2248) in the vacuum arc spectrum of K.

W. H. Ross

Magnetic rotation in various liquids in the short infra-red spectrum. I. R. INGERSOLL. *J. Optical Soc. Am.* 6, 663-81(1922).—The results are given of measurements of the magnetic rotation and in some cases the refractive index of 40 different liquids in the spectral region between wave lengths 0.56 μ and 2.3 μ . About $\frac{1}{2}$ of these substances were aq. solns. of various salts, mostly of the ferromagnetic metals. The others were pure liquids. The accuracy of the measurements of magnetic rotation (spectrophotometric method) is of the order of 1% through the middle of the spectral region with somewhat larger probable error at the ends of the region. For positively rotating liquids such as alcs., ether, CHCl_3 , and heptane the rotation is nearly propor-

tional to $1/\lambda$. This indicates that the infra-red absorption bands only slightly influence the rotation in this region. In the solns. the inverse square law holds in a general way but not as well as for pure liquids. The few negatively rotating liquids show a much great rotation dispersion. In TiCl_4 and in a concd. soln. of FeCl_3 , the rotation is nearly proportional to $1/\lambda$. In a soln. of $\text{K}_4\text{Fe}(\text{CN})_6$ it is almost proportional to $1/\lambda$. The values of e/m calcd. from measurement on positive liquids diminish for longer wave lengths.

A. W. SMITH

Application of artificial daylight to laboratory purposes (Sheringham system). S. H. GROOM. *Analyst* 47, 419-23(1922).—The phys. principles of artificial daylight are discussed. The color of an object, except in the case of very low illumination, depends solely upon the energy distribution in the source of light and the reflection or transmission characteristics of the colored object. The production of artificial daylight is entirely a matter of energy distribution. The best standard for natural daylight is north-sky light. The first essential in producing artificial daylight is that the source shall have a continuous spectrum. Since the atm. has absorbed some of the longer waves and scattered some of the shorter ones, the max. energy from a blue sky is about 4500 Ångström units as compared to the max. energy of 5900. The transformation of artificial light to daylight is a process of eliminating rays in increasing amts. from the blue to the red end of the spectrum. As a result of this absorption only about 20% of the energy is available. Suitable absorption of certain wave lengths has been obtained by the use of transparent glass screens colored by the inclusion of compds. of Cu and Mn. Difficulty has been experienced in making successive melts of glass which are identical in quality of color. Sheringham daylight employs the light from a gas-filled elec. lamp thrown upward by means of a reflector on to the interior of a shade, colored in definite areas with specially selected ultramarine, emerald-green and yellow. The under reflector prevents the escape of any uncorrected light. This method has the advantages of indirect lighting, good diffusion, absence of sharp shadows and is reproduced with little difficulty.

A. L. D.

The action of light on mesonitroanthracene. M. BATTEGAY, PH. BRANDT AND J. MORITZ. *Bull. soc. chim.* 31, 915-17(1922).—When a dil. sol. of mesononitroanthracene in EtOH is exposed to the action of sunlight, a simultaneous oxidation and reduction take place with the formation of AcH and strong fluorescence. On shaking with air the fluorescence disappears with the formation of anthraquinone. The nature of the fluorescing compd. is not known.

J. B. BROWN

Luminescence as a factor in artificial lighting. R. L. NICHOLS. *Trans. Am. Illuminating Eng. Soc.* 16, 331-45(1921); *Science Abstracts* 25B, 278-9.—The luminescence of cold bodies is of 2 distinct types: (1) the form of light given off by marine forms and certain other animals and plants; (2) that of certain chem. compds. which give off light when exposed to light, to the cathode discharge, to X-rays, or to Ra (phosphorescence). Ordinary phosphorescent substances have a brightness of the order of 0.00001 that of a W filament at 2000°, or about 0.01 Lambert. A table is given showing the brightness of various samples of willemite, Sidot blende, CaS, canary glass, calcite, cadmium phosphate, uranyl potassium sulfate, uranyl ammonium sulfate, uranyl rubidium chloride, uranyl potassium nitrate, uranyl nitrate, uranyl cesium nitrate, uranyl acetate, uranyl potassium fluoride, uranyl cesium acetate, and uranyl lead acetate. The Nernst glower, mantle burners, flaming arcs, vacuum tubes, the lime light, and luminous flames in which C is not the glowing material are given as examples of hot bodies whose light is in part due to luminescence. The structure of flame spectra is such as to indicate that luminescent bodies are present in them. If the luminescence of ZnO be excited by the edge of a H flame, it is found that at 800°, where the effect is greatest, it is 11 times as bright as the ideal black body and 115 times as bright as the non-luminescent oxide.

Oxides such as CaO , MgO , BeO , ZnO , SiO_2 , and Al_2O_3 , certain of the rare earths, and fluorite when heated to 1000° in the O-H flame appear blue instead of red. The brightness of the radiation at 0.45 microns for Al_2O_3 is 1900 times as bright as for a black body at 665° ; but only about 2 times as bright at 1500° . The incandescent solid produced in the burning of Mg is very powerfully luminescent. Its color temp. is 5000° , while its actual temp. is not over 2000° . The total efficiency of light energy is 10% of the heat of combustion, a value unapproached among the known transformations of energy used in the production of light.

D. MACRAE

Action of the arc light on aqueous oxalic acid solutions in the presence of ferric, chromic and mercuric chloride; of uranyl acetate and of iodic acid. H. KUNZ-KRAUSE AND P. MANICKZ. *Ber. pharm. ges.* 32, 209-16(1922).—The exptl. evidence indicates that under the catalytic action of FeCl_3 5.3 of cryst. oxalic acid suffers decompn. with evolution of CO_2 after a 5-hr. arc light exposure; 61.7% after 16 hrs. With $(\text{NH}_4)_2\text{C}_2\text{O}_4$ and in the presence of HgCl_2 12.46% decomposes after 2 hrs. Uranyl acetate and HIO_3 effect decompn. of cryst. $\text{C}_2\text{H}_2\text{O}_4$ to the extent of 5.49 and 4.55%, resp., after a 4- and a 3-hr. exposure, resp. CrCl_3 cannot replace FeCl_3 as catalyzer in such expts. on $\text{C}_2\text{H}_2\text{O}_4$. Qual. action equivalence obtains between natural and arc light in the case of $\text{C}_2\text{H}_2\text{O}_4$ and catalyzers HgCl_2 , uranyl acetate and HIO_3 .

W. O. E.

Treating carnotite or similar ores. W. A. SCHLESINGER. U. S. 1,435,180, Nov. 14. Radioactive constituents are extd. from carnotite or allied ores by heating with Na_2CO_3 and H_2O under 60-100 lbs. pressure per sq. in.

4—ELECTROCHEMISTRY

COLIN G. FINK

Ernesto Stassano. ROBERT PITAVALL. *J. four électrique* 31, 132-3(1922).—An obituary.

C. G. F.

Ernesto Stassano (1859-1922). *Rev. metal.* 19, 637-8; *Chem. Met. Eng.* 27, 872-4 (1922).

F. J. C.

Electrochemical developments in Italy. ANON. *J. Soc. Chem. Ind.* 41, 498-9R (1922).

E. J. C.

The electrochemical and electrometallurgical industry in Switzerland during 1921. ANON. *Mon. sci.* [5] 12, 241-3(1922).

E. J. C.

Efficiency of electric power supply. CHAS. P. STEINMETZ. *Iron Age* 110, 1487-9 (1922).

E. J. C.

Present status of the electric furnace. J. A. MATHEWS. *Blast Furnace & Steel Plant* 10, 542-4(1922).

E. J. C.

Hawley electric furnace. ANON. *Metal Ind.* 20, 425(1922).—This furnace is designed for melting non-ferrous metals and alloys. Heat is generated by an arc between two horizontal electrodes and reflected out to the charge. The shell is that of a familiar type of oil-burning brass furnace and permits casting directly or through a ladle. It may be charged in horizontal or vertical position. The shape of the cauldron permits of rigid construction, interlocking lining and uniform heat absorption. An automatic oscillating mechanism is provided for mixing. Furnaces of 600, 1200 and 2500 lb. capacity are to be built but only the 1200 pound (150 kv.-amp.) size is now available.

W. E. RUDER

Pilot-light control for furnace electrodes. C. E. SIMS. *Elec. World* 80, 1335 (1922); *Bur. Mines, Reports of Investigations* No. 2411, 2(Nov. 1922).—Automatic control similar to that of the Hall Al cell is secured for a single-phase elec. furnace by employing two ordinary 40-watt W-filament lamps, set upright on a shelf near the meter

board, with each lamp connected to one electrode (or busbar). The lamps have a common connection to the metal bath. The brilliancy of the filament varies with the drop in potential between the electrode and the bath. When the arcs are not the same, the difference is indicated by the lamps and if one electrode touches the bath, its pilot-light is extinguished. For 3-phase operation one more lamp is connected to the third electrode.

W. H. BOYNTON

Resistivities of some granular resistor carbons. C. E. WILLIAMS. *Trans. Am. Electrochem. Soc.* 42 preprint (1922).—The important requirements of a satisfactory resistor material are (1) small change in resistance with temp.; (2) low ash content; (3) high resistance to oxidation, and (4) sufficient density, physical strength, and hardness to withstand mechanical forces tending to break up particles. Graphite, carbon in various sizes, retort carbon, various cokes and charcoals were measured. Curves given show that, while there is a wide difference in resistivity at lower temps., various types and sizes of C arc nearly the same at 1000–1200°. The temp. coeff. is negative for all forms tested up to about 1200°, at which point it approaches 0 and then becomes positive. This change is more pronounced in graphite than in other forms of carbon. Volatile matter causes high resistance. Ash, if contained within the particle, increases contact resistance and coeff. slightly, but when extraneous, increases both resistance and coeff. to a very marked extent.

W. E. RUDER

Some electrical properties of alloys at high temperatures. M. A. HUNTER AND A. JONES. *Trans. Am. Electrochem. Soc.* 42 preprint (1922).—The sp. resistance of a number of metals and alloys, Ni, Cu-Ni, Fe-Ni, Ni-Cr, Ni-Fe-Cr, and Fe-Cr, such as are used as heating elements of commercial units were measured at temps. varying from 20–1000°. From data given it is possible to calc. the resistance of any of these materials at any operating temp. Oxidized wire has a more stable resistance than bright wire. Data for the life of high-resistance wires at 1000° are tabulated.

W. E. RUDER

Electrolytic refining of copper. Separation of silver from the sludge. J. M. F. LABREDA. *Anales soc. españ. fis. quim.* 20, 199–206 (1922).—In an electrolytic Cu refinery in Spain the slime or mud accumulating in the bottoms of the cells contains about 5% of metallic Ag. By careful roasting of the dried mud the FeSO_4 and CuSO_4 present are changed to oxides and most of the Ag is converted to Ag_2SO_4 . The mixt. is then ground in a ball mill and leached with hot H_2O and the whole operation repeated. Then the residue is treated with dil. H_2SO_4 to form CuSO_4 , the Fe_2O_3 remaining insol. The Ag is pptd. from its soln. by Cu. Operations over several months showed a recovery of 90% of the Ag, fineness 980–90.

L. E. GILSON

Rate of sulfation of battery plates. G. W. VINAL AND L. M. RITCHIE. *Elec. World* 80, 1383–5; *Chem. Met. Eng.* 27, 1116–8 (1922).—A description of a rapid accurate measurement of the rate of sulfation. Good measurements were obtained by successive weighing of the plates immersed in solns. under const. temp. control. Two sets of plates of nearly the same dimensions were tested. The positives showed PbO_2 content of 97%, while the negatives were 97 and 91.5% Pb, resp. The equiv. loss in amp. hr. capacity is computed from the rate of change in wt. of the plates. Chem. reaction at the negative plate predominates during self-discharge, whereas local action at the positive plate is essentially electrochem. The rate of sulfation is decreased in the satd. solns. of concns. usually found in storage batteries, a fact attributable to the protection afforded the underlying active material by the PbSO_4 , also to the increasing amount of PbSO_4 present in the solns. initially unsatd. Results are tabulated. The effects of impurities will be discussed in a later paper.

W. H. BOYNTON

The effect of dissolved substances on the deposition of colloidal particles from a solution by means of an electric current. R. D. KLEEMAN. *Phys. Rev.* 20, 272–9 (1922).—Porcelain slip is a colloidal suspension of particles of clay, flint, and feldspar

in water (= 70%). When the solid matter is deposited in a mold by electricity a creamy layer forms. If a small amt. (0.1 to 0.3%) of Na_2SiO_3 , Na_2SO_4 , Na_3PO_4 , Na_2HPO_4 , H tartrate, Na tartrate, NaOH , or KOH is added to the suspension, a slight pptn. occurs immediately and a gradual process of pptn. (of flint and feldspar esp.) goes on. If more of the clay-flint-feldspar mixt. is added and the mixt. is agitated, the pptd. material redissolves. It requires 60% solid matter to produce the same fluidity which 30% solid matter had previously produced. Elec. deposition from this suspension will give solid deposits instead of semi-liquid ones. An increase in the amt. of the substance added to the slip increases both the fluidity of the suspension and the compactness of the deposit, but successive equal additions are decreasingly effective. Both of these effects are ascribed to a decrease in vol. of the sphere of action of the colloidal particles. This decrease in vol. is due to the influence of the small amt. of substance added to the slip. Since the second deposit is solid it is assumed that the spheres of influence of its particles are not much larger than the particles. In the untreated slip the sphere of influence must be at least twice the size of the particles. With clay alone, the apparent sphere of action is 3 times the vol. of the particle. Colloidal particles remain in soln. if they sep. after collision, and ppt. if they do not. The forces which cause attraction or repulsion can be expressed in terms of interfacial surface tension. The distribution of particles under the action of gravity is calcd. and expressed mathematically.

F. E. BROWN

Lightning arresters. *J. Am. Inst. Elec. Eng.* 41, 822-4(1922).—By the use of high-resistance electrodes, JOS. SLEPIAN points out that it is practical to use gaps so small that little more than 350 v. is required to break them down. The discharge following is prevented from cong. by the resistance. No local arcs from hot spots can form, and the discharge remains in the glow form. Great caution should be used in drawing conclusions from power factor measurement as to the suitability of all cells for arresters, as expts. indicate that values vary with electrolyte renewal and removal of old film. D. W. ROPER calls attention to the *Am. Inst. Elec. Eng.* definition for a lightning arrester; this calls for an app. which must limit the voltage across the app. at the time of discharge. Many arresters now on the market do not do this. J. L. R. HAYDEN says that the deterioration of Al arresters is due to the passage of current through them. This pits the cones and changes oil and electrolyte. The total current consists of energy current and capacity current, and the energy current may be increased very greatly without noticing much change in the total, because the large proportion of the total is capacity current. N. A. LOUGER tells of test work with a lightning generator on an oxide film arrester in which the arrester not only successfully absorbed the direct stroke, but also recovered to prevent any dynamic power from following through. W. E. R.

Asbestos products as dielectrics. W. S. FRUCHT. *Beama* 11, 659, 738(1922).—Higher permissible operating temps. are desirable for elec. machinery, and should be obtainable by using inorg. instead of org. dielectrics. The origin, classification and characteristics of asbestos are given, including magnetic and elec. properties. Tests given comparing cotton and asbestos-insulated wire for the effect of heat show asbestos better except when heating in oil. The thickness of asbestos paper is not as uniform as that of other classes of paper. Tensile strengths of asbestos paper of different thicknesses are given, as well as dielec. strength. The prepn. of asbestos millboard and asbestos cement board is discussed. Tables of tests show that for higher mechanical and elec. stresses, the more expensive impregnated materials are better, though they are inferior for heating in oil. The properties of asbestos molded products are discussed. Synthetic gums like bakelite, as hinder, improve resistance. Molded products vary in their resistance to heat. Methods for increasing the spark-over voltage of asbestos are offered. Various asbestos-cementing materials are described.

A. H. DICK

Progress in wireless telegraphy due to three-electrode tubes. LOUIS FRANCOIS. *Rev. gen. sci.* 33, 37-47 (1922).

D. MACRAE

Electroplating—its past, present and future. JOSEPH HAAS, JR. *Metal Ind.* 20, 392-3 (1922).

E. J. C.

A sodium-potassium vapor arc lamp (NEWMAN) 3. Coating copper sheets with tin (U. S. pat. 1,435,260) 9.

Storage battery. W. GARDINER. U. S. 1,433,542, Oct. 31. Structural features.

Storage battery. M. J. TOWNS. U. S. 1,433,669, Oct. 31. Structural features.

Storage battery. B. FORD. U. S. 1,433,680-1, Oct. 31. Structural features.

Storage battery. E. A. MILLER. U. S. 1,434,307, Oct. 31.

Dry cell batteries. A. V. WILKER. U. S. 1,434,469, Nov. 7. Yellow Hg oxide 3% is added to depolarizing material mainly composed of MnO_2 , as an activating agent.

Dry cell battery. R. C. BENNER AND H. F. FRENCH. U. S. 1,433,526, Oct. 31. Structural features.

Dry cell battery. E. L. MARSHALL. U. S. 1,434,303, Oct. 31. Raw uncooked flour is placed between the metal shell of the battery and a porous paper lining, in order to avoid diffusion of the battery paste through the lining.

Zinc battery material. A. CELLINO. U. S. 1,433,602, Oct. 31. A compressed mass of Zn particles coated with Hg and hard or other grease and an alkali ferrocyanide is used as a battery element with electrolytes such as H_2SO_4 solns. to prevent action of the electrolyte on the Zn when the battery is on open circuit but permit action on closed circuit.

Electrolytic zinc recovery. J. T. ELLSWORTH. U. S. 1,435,703, Nov. 14. Sb is removed from Zn-bearing solns. by the action of H_2S before electrodeposition of Zn, in order to prevent deleterious effect of the Sb during electrolysis. Before the use of H_2S , a preliminary purification with partial removal of Sb is effected.

Electrolytic treatment of colloidal sludges. W. ACTON AND W. M. MACKEAN. U. S. 1,435,886, Nov. 14. Solid and liquid components of colloidal sludges are sepd. by passing the sludge under pressure between rolls one of which constitutes the anode and the other the cathode.

Nickel anodes for electrodeposition. G. B. HOGABOOM. U. S. 1,433,618, Oct. 31. Cast, rolled or electrolytic anodes of Ni are given an increased corroding rate by heat-treatment at 750-1100° or a higher temp. in order to alter the cryst. structure of the metal.

Electrolytic cell for generating hydrogen and oxygen from water. I. H. LEVIN. U. S. 1,434,543, Nov. 7. Structural features.

Apparatus for electrical precipitation of suspended particles from gases. L. W. CHUBB. U. S. 1,433,699, Oct. 31.

Electrolytic condenser, rectifier or lightning arrester. R. D. MERSHON. U. S. 1,433,736, Oct. 31. Electrolyte such as a borax and H_3BO_3 soln. is delivered through electrodes (which may be formed of sheet Al) at a uniform velocity.

Carbide manufacture. A. E. REID. U. S. 1,434,451, Nov. 7. A mixt. of bituminous coal and limestone is fed downwardly into the carbide-forming zone of an elec. furnace so that the gases from the reaction zone effect preliminary coking.

Reducing zirconium, cerium or other metals in an electric arc furnace. P. FRIEDMAN AND E. GREETHAM. U. S. 1,433,541, Oct. 31. Metallic compds. such as oxides, nitrides or nitrates of Zr, Ce or U are fused and reduced in a direct-current arc furnace in an atm. of inert gas such as Ar or He from which active gaseous impurities are removed during the fusing and reduction by reaction on red hot Ca or other reagent.

Electric resistance furnace. O. A. COLBY. U. S. 1,435,211, Nov. 14. Overheating of electrodes is prevented by placement of a mass of granular graphite or coke between resistors and electrodes.

Electric resistance furnace for tempering tools. O. A. COLBY. U. S. 1,433,700, Oct. 31.

Electric sherardizing furnace. A. M. MACFARLAND. U. S. 1,433,735, Oct. 31.

Electric arc furnace for nitrogen fixation. L. FRIDERICH. U. S. 1,433,883, Oct. 31.

Electric furnace for calcining anthracite. F. A. J. FITZGERALD. U. S. 1,434,053, Oct. 31. An outer shell of the furnace is cooled by fluid supplied from a perforated pipe around its upper external edge.

Conductor for electric furnaces. K. C. RANDALL and H. A. TRAVERS. U. S. 1,435,256, Nov. 14. Structural features.

Nickel-plated half-tone plates. E. E. STAFFORD. U. S. 1,434,798, Nov. 7. A Cu plate is over-etched to an extent equal to the desired thickness of the Ni to be deposited and is then plated with Ni.

Zinc electroplating. C. H. PROCTOR and C. J. WERNLUND. U. S. 1,435,875, Nov. 14. In Zn electroplating from a bath contg. Zn and Na cyanides and NaOH, an anode is used contg. Zn and 1% Hg in order to increase the overvoltage of the cathode and improve the Zn deposition.

7—ANALYTICAL CHEMISTRY

WILLIAM T. HALL

Progress in metal analysis in 1921. TH. DÖRING. *Chem.-Zig.* **46**, 937-9, 981-2, 1021-3, 1046-9, 1069-71(1922); cf. C. A. **16**, 694.—A review with literature references.

E. J. C.

Titrimetric determination of magnesium in potassium salts. A. VÖRTHEIM. *Chem. Weekblad* **19**, 461-2(1922).—The method of H. PRECHT (*Z. anal. Chem.* **18**, 438(1879)) is found to be correct. According to this method Mg is detd. by adding NaOH (free from CO₂) and titrating the filtrate with acid.

R. BEUTNER

Estimation of aliphatic nitrate esters in the presence of certain nitro aromatic compounds. W. J. HUFF and R. D. LEITCH. *J. Am. Chem. Soc.* **44**, 2643-5(1922).—The method is essentially that developed by Phelps for the detn. of inorg. nitrates (*Am. J. Sci.* **14**, 440(1902)). Fit a 250-cc. Kjeldahl flask with a 2-holed stopper carrying a long stemmed separatory funnel whose tip is drawn to a capillary and with an 8 mm. tube bent twice at right angles and dipping into a shallow layer of Hg. Introduce about 25 cc. H₂O into the flask and boil to expel air, carefully lower the temp. and introduce the nitrate ester or its mixt. with NO₂ compds., in through the funnel, by a known excess of standard FeSO₄ soln., contg. enough H₂SO₄ to prevent sepn. of the basic salt, and some concd. HCl. Evap. the mixt. to 10-5 cc., nearly neutralize with Na₂CO₃, dil. when cold to about 600 cc. and add a little MnSO₄ and titrate the residual Fe⁺⁺ salt with KMnO₄.

C. A. R.

Inversion of sucrose in alkaline copper solution. E. CANALS. *Bull. soc. chim.* **31**, 583-8(1922).—Sucrose (A) in the presence of alk. Cu soln. is not stable above 15-20° and when large amts. of A are present in invert sugar (B) the error in the detn. is serious. A pure 20% soln. of A at 15-16° during 72 hrs. gave no reduction. In detg. A by the direct method, data were secured showing that A hydrolyzes during the time necessary for the detn. of reducing sugar. According to Bertrand's method, the reducing sugar is boiled 3 min. with an excess of alk. Cu soln., the Cu₂O is filtered, dissolved in excess Fe₂(SO₄)₃ and the FeSO₄ is then detd. with KMnO₄. Expts. show that during the operation of this procedure the quantity of B produced is a direct function of the A content of

the soln. The amt. of B formed varies directly as the quantity of heat supplied and also as the time of heating. When B was detd. in a soln. heated with a free flame, and when heated in a boiling water bath, more B was found in the soln. heated over the free flame. The importance of observing the precautions indicated is pointed out. The sties of the flasks contg. the B should not be overheated and more concordant results were secured when the steam bath was used. C. could not stabilize a 30% soln. of A by treatment with 30% KOH. The procedure which gave the best results was as follows: Place solns. in Bohemian glass tubes, 75 mm. in diam., add 40 cc. of the alk. Cu soln., place the tubes in a boiling water bath and allow to remain 10 min. After removal of the tubes from the bath, wait 2 min. and then proceed as recommended by Bertrand. Run a blank on pure A and apply the corrections. H. E. WILLIAMS

Tables for the microscopic identification of inorganic salts (FRY) 2. Color test for oxalic acid (MÜLLER) 28.

8—MINERALOGICAL AND GEOLOGICAL CHEMISTRY

EDGAR T. WHERRY AND EDW. F. HOLDEN

Supplement to the determination and study of oxide minerals. Their transformation to sulfides. AD. BRALY. *Bull. soc. franc. minéral.* 45, 17-20(1922).—It is sometimes advantageous to confirm the blowpipe reactions of oxide minerals by tests after transforming them to sulfides. This may be done by fusing the oxide with an excess of S in a closed capsule, until the excess is completely volatilized. E. F. H.

Contributions to Mexican mineralogy. IV. E. WITTICH AND J. KRATZERT. *Soc. Scient. "Antonio Alcala"* 40, 423-33(1922).—The Guadalupe diopside has been studied in detail because of its unusual compn., almost that of jade, and because of its occurrence in granite. It was found to be an isomorphous mixt. of diopside 48.9%, aegirine 7%, jadeite 10.5%, augite 11.3%, and wollastonite 22.1%. Danburite from the same locality has also been studied chemically and optically. It occurs likewise in granite associated with quartz, tourmaline, fluorite, pyrite, pyrrhotite, axinite, and epidote. Some data are given concerning prehnite. O. B. H.

Color of colored fluorites. T. SAKAO AND M. HIROSE. *Chem. News* 125, 213 (1922).—See C. A. 16, 4160. E. J. C.

Garnet from the island of Ouessant. DEDEAUPUIS. *Bull. soc. franc. minéral.* 45, 5-7(1922).—Crystals of grossularite (sp. gr. 3.56) and almandite (3.77-3.88) showed the forms $a^2(211)$, b^1 , a^2p . They are transparent to opaque. Certain rose and violet crystals are suitable for gems. The optical and blowpipe properties are given. The mineral occurs in a mica-schist. EDW. F. HOLDEN

The formation of the Carpathian petroleum. K. FRIEDL. *Petroleum Z.* 8, 993-903(1922).—A description of the geology of the Carpathian region is given. Evidence is presented to establish the theory that the Menilite shale was the original source of petroleum in this region. D. F. BROWN

New discoveries and outlines in the petroleum geology of the Carpathians. W. PETRASCHKE. *Petroleum Z.* 8, 933-6(1922).—A general description of the geological formations in this region is given. From all observations it is deduced that the tuffite strata are limited to the deepest part of the thick and uniform Miocene layers. In the tuffite the evidence makes it possible to find anticlines in the Miocene. D. F. B.

Origin of petroleum. E. PYHÄLÄ. *Petroleum Z.* 8, 1069-73(1922).—Previous investigations tend to show that N occurs in petroleum in the form of pyridine and quinoline derivative bases. It is shown that the pink to violet color which appears on distg. petroleum in the laboratory is a color reaction developed by the petroleum bases reacting

with the mineral acids formed in the distn. It is also shown that Baku oil contains N in the form of amino acids, but it is not thought that animal and vegetable fats had any very important part in the formation of petroleum. D. F. BROWN

The origin of epidote in certain granitic rocks. LOUIS DUPARC. *Bull. soc. franc. minéral.* 45, 21-7(1922).—Primary epidote occurs in granitic rocks from Mont Blanc; and either primary or more probably derived from an absorbed epidotic rock, it is found in a plagioclase-granite from Syssertskayadatcha, Urals. E. F. H.

9—METALLURGY AND METALLOGRAPHY

D. J. DEMOREST, ROBERT S. WILLIAMS

The metallurgical chemist. C. H. DESCH. *J. Soc. Chem. Ind.* 41, 478-80R (1922).—Lecture on the occasion of the presentation of the *Streetfield Medal* to D. E. J. C.

Sheet steel plant in Ashtabula completed. F. J. CROLIUS. *Blast Furnace & Steel Plant* 10, 623-8(1922).—Pulverized coal firing is used. Rolling, annealing and galvanizing are discussed. E. J. C.

The reduction and treatment plant of the Transvaal Silver & Base Metals. H. W. CLAYDEN. *S. African Mining Eng. J.* 33, 123, 161-3(1921).—Description of a Ag-Pb works at Argent Station, Transvaal. A. BUTTS

Dust in milling plants. M. W. VON BERNEWITZ. *Eng. Mining J.-Press* 114, 1070-1(1922).—Suggestions for dust reduction. E. J. C.

Heating furnaces for blooms, slabs and billets. W. P. CHANDLER, JR. *Blast Furnace & Steel Plant* 10, 556-62; *Iron Age* 110, 1211-4(1922). E. J. C.

A review of steel mill electrification. B. G. LAMME. *Iron Age* 110, 1497-9(1922). E. J. C.

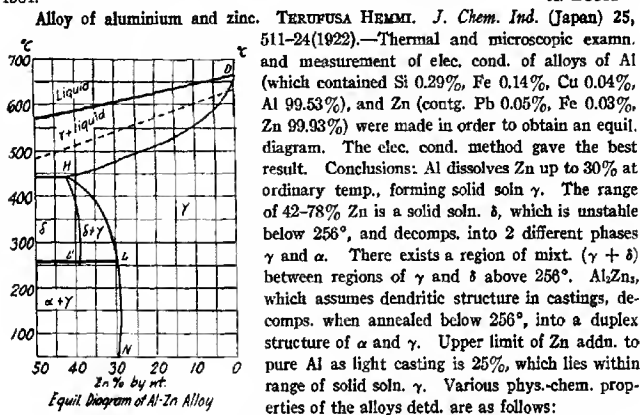
Bases of modern blast-furnace practice. A. K. REESE. *Engineering* 114, 312-6; *Blast Furnace & Steel Plant* 10, 495-9, 568-74; *Iron Age* 110, 1353-5; *Chem. Met. Eng.* 27, 1037-8(1922).—See C. A. 16, 3842. E. J. C.

The Nevill-Soanes copper process. P. W. NEVILL, A. MONTGOMERY AND F. C. STOCKWELL. *Mining Mag.* 27, 73-9(1921).—The process, owned by the Australian Mineral Recovery Co., has been tried out successfully in lab. and larger-scale expts. in Australia. Oxide or carbonate ore is finely crushed and treated with very dil. (about 0.5%) H_2SO_4 or $FeSO_4$ in the presence of metallic Fe. The mineral is decomposed and Cu pptd. on the Fe all in one step, without filtering. The pptd. Cu is then recovered by washing or flotation. Extn. reaches 90%, and Au and Ag are also recovered. Since the reactions are regenerative, the amt. of H_2SO_4 or $FeSO_4$ required is very small; 1 part Cu is liberated by use of $1/100$ part H_2SO_4 . Fe filings or nails are used, and the consumption is very small. NaCl is added to facilitate the reactions. The process is carried on at about 70°, with steam heating. Agitation also is necessary. The cycle of reactions is very rapid, and the Cu is actually in soln. only momentarily if at all. Plant outlay is small, but the heating during treatment is a disadvantage. A. B.

Aluminium melting practice. R. J. ANDERSON. *Foundry* 50, 737-41, 792-6 (1921).—The same types of furnaces are commonly used for melting Al alloys as for brass. The melting temp. is 50-100° higher than the pouring temp.; both should be as low as possible. Overheating in itself is not injurious, but usually results in oxidation or gas adsorption, with large dross losses. Al is covered with a thin film of oxide, or hydroxide, formed at room temp., which is partly protective against further oxidation; but this does not prevent oxidation at high temp., which will be rapid when fresh metal surfaces are exposed in a molten bath. Al_2O_3 is heavier than Al, and so becomes occluded throughout the melt; the surface covering of dross is due to surface-tension effect.

Sampling of drosses is very difficult and buying is, therefore, done not on the basis of a chem. analysis, but on a trial melt of a large sample. Part of the dross loss is due to formation of AlN . In ordinary furnace atms. CO_2 , CO , H_2 , CH_4 , and SO_2 are neutral gases to Al; O_2 and H_2O form Al_2O_3 and possibly other oxides. Volatilization of Al is not important except in arc furnaces. Heat requirements, constants, and the application of different fuels are discussed and types of furnaces described. Cf. C. A. 16, 1384.

A. BUTTS



	Zn%	Elastic limit kg./mm. ²	Tensile strength kg./mm. ²	Elonga- tion on 60.8 mm. %	Reduc- tion in area %	Brinell number	Sp. gr.
Chill cast	10.36	10.48	13.66	14.	20.5	59.	2.94
	19.42	16.59	23.40	6.5	11.8	81.	3.09
	36.67	18.48	29.00	2.0	5.07	80.	3.55
Sand cast	9.97	12.60	14.7	8.2	10.0	36.0	2.88
	19.53	17.37	19.86	1.8	3.7	61.0	3.07
	33.95	18.26	25.8	1.6	1.7	74.0	3.40

S. T.

Slide rule for calculating alloy additions. ANON. *Blast Furnace & Steel Plant* 10, 628(1922). E. J. C.

Recent progress in microscopic metallography and in macrography. L. GUILLET. *Rev. metal.* 19, 614-25(1922). E. J. C.

British specifications for malleable. BRITISH CAST IRON RESEARCH ASSOC. *Foundry* 50, 995(1922). E. J. C.

The history of bronze founding. C. H. DESCH. *Engineering* 114, 625-6(1922). E. J. C.

Casting steel ingots centrifugally. L. CAMMEN. *Iron Age* 110, 1494-6(1922). E. J. C.

Centrifugal casting [of metals]. L. CAMMEN. *Metal Ind.* 20, 457-8(1922). E. J. C.

Casting of aluminium bronze. CHAS. VICKERS. *Foundry* 50, 958-60(1922). E. J. C.

Making non-ferrous castings. G. A. DRYSDALE. *Foundry* 50, 1006-7(1922). E. J. C.

Continuous annealing furnace for sheets. ANON. *Iron Age* 110, 1342-3, 1362 (1922); illus.—A description of car-type furnaces with a daily capacity of 125 tons each of the Ashtabula Steel Co. Powd. coal is used. E. J. C.

Cutting massive copper with the electric arc. A. M. CANDY. *Chem. Met. Eng.* 27, 1036(1922). E. J. C.

The wrought nonferrous alloys in 1922. W. H. BASSETT. *Ind. Eng. Chem.* 15, 31-2(1923). E. J. C.

Vacuum apparatus for removing gases from liquids (cyanide solutions). (U. S. pat. 1,433,965) 1.

Hydraulic ore-concentrating apparatus. A. S. HILLEKE. U. S. 1,434,386, Nov. 7.

Treating zinc-bearing ores or concentrates. J. H. GILLIES and P. M. GILLIES. U. S. 1,434,693, Nov. 7. The material, e.g., Tasmanian Zn ore, is coarsely crushed and partially desulfurized. The fines are collected and subjected to a sep. sulfatizing roast, mixed with the coarser portions and with carbonaceous material, agglomerated and fumed in a furnace. The furnace clinker is retreated to recover precious metals and Cu and the Zn and Pb fume is treated with H_2SO_4 soln., insol. $PhSO_4$ is sepd., the $ZnSO_4$ soln. is purified, after heating to about 80° , by the addition of Ba sulfide, and electrolyzed.

Treating zinc sulfide ores. N. C. CHRISTENSEN. U. S. 1,434,084, Oct. 31. ZnS ore is treated with hot H_2SO_4 of sufficient concn. to decompose the ZnS and form $ZnSO_4$ and in sufficient amt. to dissolve the $ZnSO_4$. The acid $ZnSO_4$ is then cooled and the $ZnSO_4$ pptd. U. S. 1,434,086 specifies a similar process, except that the washings from the ore residue form a dil. $ZnSO_4$ soln. which is then concd. to facilitate pptn. of the $ZnSO_4$.

Treating sulfides ores of zinc. N. C. CHRISTENSEN. U. S. 1,435,699, Nov. 14. Ores or concentrates contg. ZnS are treated with hot H_2SO_4 of sufficient concn. and amt. to decompose the ZnS and dissolve the $ZnSO_4$ formed. The mixt. of ore residue and hot acid is afterward cooled and $ZnSO_4$ is pptd. from the acid.

Treating lead-zinc sulfide ores. N. C. CHRISTENSEN. U. S. 1,435,891, Nov. 14. Comminuted Pb-Zn sulfide ore or concentrate is treated with a hot concd. acid chloride soln., preferably $FeCl_3$, to dissolve Pb and Ag as chlorides, the chloride soln. is sepd. from the residue and Pb is electrolytically pptd. from it. The solid residue of the original treatment is treated with hot concd. H_2SO_4 to dissolve the Zn as sulfate, the hot soln. is sepd. from the solid residue and is cooled to ppt. $ZnSO_4$.

Treating lead-zinc sulfide ores or concentrates. N. C. CHRISTENSEN. U. S. 1,434,088, Oct. 31. Comminuted ore or concentrate contg. sulfides of Pb and Zn is treated with hot concd. H_2SO_4 to dissolve the Zn as $ZnSO_4$ without dissolving much Pb. The hot acid soln. is sepd. and cooled to ppt. $ZnSO_4$ and the ore residue is treated with a hot concd. chloride soln. contg. $FeCl_3$ to dissolve Pb and Ag and reduce Fe^{+++} to Fe^{++} . Ag is pptd. from the soln. and the latter is then electrolyzed to ppt. Pb and produce Cl, which is used to reoxidize the Fe^{++} to Fe^{+++} compds. for reuse in the process.

Treating ores containing galena. N. C. CHRISTENSEN. U. S. 1,434,087, Oct. 31. Ores contg. PbS are treated with a hot concd. soln. contg. NaCl and $FeCl_3$ to dissolve the Pb as chloride and the chloride is pptd. by cooling the soln. after sepn. from the ore residue.

Treating ores with chloride solutions. N. C. CHRISTENSEN. U. S. 1,434,085, Oct. 31. Ore which may contain Ag, Pb and Cu with $CaCO_3$, $MgCO_3$ and Fe and Mn compds. is treated with an acid chloride soln., e.g., $CaCl_2$ and HCl soln., and after metallic values such as Au, Ag, Cu and Pb have been pptd. from the soln. the barren soln. is used for further lixiviation of the ore residue. Comminuted fuel, e.g., coal dust, is

mixed with the ore residue and the liquid which it retains and the mixt. is subjected to a blast roast to drive off the acid for recovery and use on additional ore.

Obtaining metals from ores. A. L. DUVAL D'ABRIAN. U. S. 1,434,485, Nov. 7. Oxides or chlorides of Cr, Zr, V, U, Co, Ag or Ni are obtained from ores or ore residues carrying these metals by heating the material with gaseous Cl to effect volatilization removal of the Fe as chloride and then treating the Fe-free material to sep. the metallic values as desired. U. S. 1,434,486 specifies subjecting similar starting materials to the action of Cl in stages at successively higher temps. to effect selective successive formation and fractional volatilization of different metallic chlorides.

Reducing arsenic oxide. J. F. CULLEN. U. S. 1,433,533, Oct. 31. As oxide is fed to an incandescent mass of coke or similar carbonaceous material in a reducing atm. to vaporize the oxide and effect its reduction to As, which is withdrawn with the gases evolved and condensed.

Reducing iron oxide. D. M. CRIST. U. S. 1,434,484, Nov. 7. Fe_2O_3 or Fe_3O_4 is heated in a closed retort to a temp. sufficiently high (about 650°) to effect dissociation of the oxide; air and O are removed from contact with the heated mass and the residue of Fe is cooled out of contact with O.

Iron sponge. A. SINDING-LARSEN. U. S. 1,433,854, Oct. 31. See Can. 225,444 (C. A. 17, 54).

Purifying tin ore before smelting. A. L. JENNINGS and J. P. DOLAN. U. S. 1,435,303, Nov. 14. Sn ore is fused with NaHSO_4 before smelting in order to remove impurities such as can thus be converted into sol. sulfates.

Recovering metallic values from fume precipitates. A. SCOTT. U. S. 1,435,505, Nov. 14. S- and chloride-contg. fume such as obtained in elec. fume pptn. is heated with C and CaO or CaCO_3 to reduce a portion of the metal of the chlorides to metallic form and form a mat contg. a portion of the metal and a slag contg. CaCl_2 . U. S. 1,435,506 relates to an otherwise similar process in which the reducing agent is omitted so that the entire metal value may go into the mat formed.

Blast furnace. J. KENNEDY. U. S. 1,435,857, Nov. 14. The inner masonry wall of a blast furnace is surrounded by an outer metal shell extending the full height of the shaft and constituting its only external support.

Device for charging blast furnaces. T. McDONALD. U. S. 1,433,633, Oct. 31.

Cupola furnace for melting iron. H. KOCH. U. S. 1,435,610, Nov. 14. The furnace comprizes a vertically movable upper shaft portion, a laterally movable hearth portion and a vertically adjustable ladle portion below the hearth for receiving molten metal.

Filter press for recovering metals from cyanide solutions. L. D. MILLS. U. S. 1,433,966, Oct. 31.

Settling apparatus (Dorr thickeners). J. V. N. DORR. U. S. 1,434,596-7, Nov. 7. The app. is adapted for thickening ore pulps.

Pickling ferrous metals. O. VOGEL. U. S. 1,433,579, Oct. 31. A compn. for removing oxides from Fe, Fe alloys or steel is formed of "anthracene residues" or a similar distn. residue mixed with an acid substance, e. g., HCl or H_2SO_4 .

Pickling iron. E. H. HINCKLEY. U. S. 1,434,011, Oct. 31. Fe to be pickled is immersed in a soln. of H_2SO_4 of such concn. and temp. (preferably about 0.5% strength at 90°) as to maintain substantially a max. efficiency of ionization and capacity of absorbing FeSO_4 .

Direct manufacture of refined iron or steel. L. P. BASSETT. U. S. 1,435,686, Nov. 14. A mixt. of Fe ore, coal and lime is heated by a flame nearly free from CO_2 and H_2O , in the continued presence of a basic slag contg. a small amt. of Fe oxide to prevent reduction of P, Si and Mn compds. and thereby prevent contamination of the

Fe with these elements or with S. The flame employed may be from fine coal blown in with air.

Manganese steel. R. A. HADFIELD. U. S. 1,435,294, Nov. 14. A steel alloy is formed contg. 2% or more Mn, 0.7-2% of C, 0.1% or more Si and 0.50-1.75% Cu. Alloys of this compn. are tough and suitable for forming rolled plates.

Manganese steel containing copper. R. A. HADFIELD. U. S. 1,435,840, Nov. 14. Cu 1-4% is added to Mn steel in order to toughen it.

Vanadium alloys. B. D. SAKLATWALLA and A. N. ANDERSON. U. S. 1,435,742, Nov. 14. V oxide or sulfide ore or a similar V-bearing material is fed, together with Fe ore, lime or other flux and carbonaceous material, directly into the high-temp. zone of an elec. furnace, in order to form ferro-V.

Alloy of cobalt, tin and molybdenum. A. S. HATFIELD. U. S. 1,434,246, Oct. 31. An alloy which is adapted to many engineering uses is formed of Co 75, Mo 20 and Sn 5 parts.

Iron-silicon alloy sheets. W. J. BECK and J. A. AUPPERLE. U. S. 1,434,081, Oct. 31. Annealed Fe-Si alloy sheets are coated with Si compds. (remaining as a surface residue after pickling in 5% H_2SO_4 soln.) to form a durable enamel-like coating.

Uniting hard steel alloys to softer steels. J. H. L. DEBATS. U. S. 1,434,047, Oct. 31. The surface of a piece of softer tough steel to be united with high-speed steel is coated with a brazing metal, e. g., powdered Cu and flux, and after placement of this piece in a mold molten high-speed steel is poured into a space within the mold against the coated tough steel and allowed to solidify in union with the latter.

Phosphor-copper. A. MIHALIC. U. S. 1,435,649, Nov. 14. A mass of P is imbedded in a larger mass of subdivided Cu in solid form and the materials are melted together.

Preventing corrosion of copper or copper alloys. F. VON WURSTEMBERGER. U. S. 1,435,268, Nov. 14. Corrosion of Cu or Cu alloys in app. exposed to sea-water is prevented by keeping liquids which come into contact with the metal continuously in motion so that stagnant liquid has no chance to cause corrosion.

Coating copper sheets with tin. J. B. RUSS. U. S. 1,435,260, Nov. 14. Cu sheets are electrolytically coated with a layer of Sn of the thickness finally desired and the coated sheets are then heated in an oil bath to slightly below the m. p. of Sn in order to render the coating firmly adherent and uniform.

Soldering flux. W. E. WYATT. U. S. 1,435,780, Nov. 14. A flux is formed of HCl, $ZnCl_2$, mercury ammonium chloride and H_2O .

Metal packing. R. F. SPROESSIG. U. S. 1,435,563, Nov. 14. A bearing alloy is poured from a considerable height upon a mass of pulverized graphite to form a spongy product of metal impregnated with and coated with graphite, adapted for journal bearings or the like.

10—ORGANIC CHEMISTRY

CHAS. A. ROUILLER

Emil Fischer's recollections. WM. J. POPE. *J. Soc. Chem. Ind.* 41, 495-6R (1922).
E. J. C.

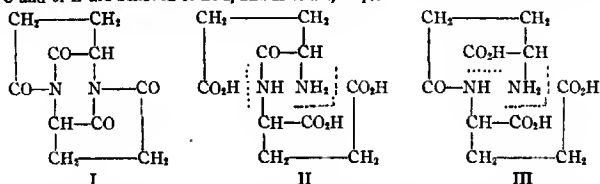
Recent developments in the organic chemistry of arsenic. W. LEE LEWIS. *Ind. Eng. Chem.* 15, 17-9(1923).
E. J. C.

Ease of migration and affinity demand ("Affinitätsbeanspruchung") of the ethyl group in the pinacolin rearrangement. BERTIL NYBERGH. *Ber.* 55B, 1960-6(1922).—According to the earlier views the course of the pinacolin rearrangement depends chiefly on the so-called ease of migration of the radicals in those cases in which the affinity

demand of these groups does not, in the splitting off of H_2O , influence the rearrangement in a definite direction. From the behavior of some sym. pinacols (e. g., $[MeEtC(OH)-]_2$ (A)) it was believed that the Me migrates more easily than the Et group, but Meerwein later found that $Ph_3C(OH)C(OH)MeEt$ yields $Ph_3EtCCOMe$ and concluded that "there can no longer be any question of a general rule on the ease of migration" (C. A. 14, 1309). N. has now found that A and $Et_3C(OH)C(OH)Me$ (B) both yield mixts. of $Et_3MeCCOMe$ (C) and Et_3COCMe_2Et (D), the relative amts. of C and D from A being about 4:1 and from B 1:20. This shows that the Et group in reality migrates much more readily than the Me group and that the observations on which M. based his views as to the irregularity of the ease of migration are erroneous. As regards the affinity demand of the Et group, the formation of the 2 isomeric pinacolins from B shows that this affinity demand cannot be so very much smaller than that of the Me group, as assumed by M., and thus deposes the Et group from the peculiar position, as compared with other aliphatic groups, which it had come to occupy in this respect. Whether the ease of migration of radicals bears any relation to their affinity demand cannot as yet be established with certainty. The A, m. 40° , and the B, b. $84-5^\circ$, were rearranged by allowing them to stand 2 hrs. in 8 parts concd. H_2SO_4 at -10° and the C and D sep'd. as the semicarbazones. D b. $150.5-2.0^\circ$, d_{20}^{20} 0.8298; semicarbazone, m. 98° , forms slowly and is easily sol. in alc. 1-Methyl-1,1-diethylacetone (C), b_{7M} $153.5-4.0^\circ$, d_4^{20} 0.8389; semicarbazone, m. 168° , forms rapidly and is difficultly sol. in alc. From 15 g. C dropped into the NaOBr soln. from 56 g. Br and 37.3 g. NaOH and heated 1 hr. on the H_2O bath are obtained a little AcOH, $MeEt_2CCO_2H$, h. $205-6^\circ$, and methyl-diethyl-lactic acid, $MeEt_2CCH(OH)CO_2H$, m. 82° , which is probably identical with the product obtained by Braun and Kittel from the (impure) pinacolin of A and to which, on no certain basis, they assigned the structure $MeEt_2CCH(OH)CH_2CO_2H$ (Monatsh. 27, 818(1906)). C. A. R.

The action of glycerol on glutamic acid at higher temperatures. Formation of cyclo-glutamylglutamic acid (2,5-diacyl-piperazine-3,6-dipropionic acid) and of glutamylglutamic acid. A. BLANCHETIÈRE. *Bull. soc. chim.* 31, 1045-63(1922).—Maillard, and Balbiano with Trasciatti (Paris, Masson 1913; *Ber.* 33, 2323; 34, 1501; *Gazz. chim. ital.* 32, 410) prepd. a series of peptides by condensing aliphatic mono- NH_2 acids by heating with glycerol; NH_3 was evolved during the reaction. Glutamic acid (A) is not expected to form, on heating with glycerol, a cyclopeptide (2,5-diacyl-piperazine), since it easily loses H_2O , forming an inner anhydride, pyrrolidonecarboxylic acid (B). (Cf. *Monatsh.* 3, 228(1882); *Gazz. chim. ital.* 19, 100, 101; *Z. physik. Chem.* 64, 447; 68, 487.) A was heated with glycerol in a flask in an atm. of pure H for 12 hrs., a separate expt. being made at each 10° interval from 130° to 200° ; it was found that CO_2 was given off preponderantly, instead of NH_3 as in the earlier expts. The % of decarboxylation was 0, 0.925, 5.425, 1.07, 1.0, 1.33, 2.15, 2.37; that of deamination was 0, 0, 0, 1.5, 3.0, 2.0, 3.0, 4.5 resp., at these temps. These 2 phenomena are secondary to the main condensation reaction. The glycerol residue in the expts. at 130° and 140° is capable of immediate titration, while those remaining at 150° and higher show a considerable lag; their acidity is about 50% of the original. The results show that the principal reaction permanently combines 1 CO_2H group, and that it is not a decarboxylation. Isolation of the condensation product from the glycerol soln. is attained by adding the calcd. amt. of $Ba(OH)_2$, followed by evapn., pptn. of the Ba salt with 10 vols. abs. EtOH, and of this filtrate with 0.5 vol. of Et_2O . Analyses show that the product is the Ba salt of cyclo-glutamylglutamic acid (C); the acid m. sharply 151° , is very sol. in H_2O and in EtOH, sol. in Et_2O , Me_2CO , insol. in PhMe, crysts. in needles from $Et_2O-EtOH$, in prisms from $H_2O-EtOH$, is very little attacked by HNO_3 . The Cu salt, a green cryst. powder, and the Mg, Pb, Ni, Hg, Ag salts, prepd. from the Ba

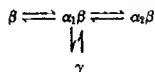
salt, are all sol. On treatment with 4 mols. of NaOH during 5 hrs. C is transformed into a small proportion of A, but mainly into glutamylglutamic acid (D). Longer treatment (15 hrs.) produces a higher proportion of A; D is sepd. as the insol. Ba salt. A soln. of the Na salt neutralized with H_2SO_4 evapd., freed from Na_2SO_4 and treated with Et_2O gives badly formed tables sol. in H_2O or $\text{H}_2\text{O}-\text{EtOH}$, and m. $167-8^\circ$; salts of other metals give no ppts. with the Ba salt; D gives free N with HNO_3 . Following the analogy of cycloaspartylaspartic acid (cf. Ravenna C. A. 16, 1398) the constitutions of C and of D are believed to be I, and II or III, resp.:



C gives a slight biuret reaction. Form II is believed to preponderate; on hydrolysis $(\text{AcO})_2\text{Ph}$ gives no insol. product.

A. R. ALBRIGHT

Keto-enol tautomerism. II. Desmotropisomeric ethyl diacetosuccinates. H. P. KAUFMANN. *Ann.* 429, 247-83(1922); cf. C. A. 16, 2311.—Besides the phys. and chem. properties of the desmotropisomers a knowledge of their equil. in the molten condition and in different solvents is of special importance. In the case of a no. of isomers the phys. methods are not available and chem. methods must be used. These include the colorimetric method (the FeCl_3 reaction of the enol), the Br titration according to Meyer and the O_3 decompn. according to Scheiber. K. discusses at some length the results of the 1st 2 methods. The liquid half-enol ($\alpha_1\beta$ -ester) of di-Et diacetosuccinate (A) does not give the FeCl_3 reaction. The previously observed brown coloration depends upon the presence of impurities. It adds Br in nearly the theoretical amt., while the α -ester, m. 45° , and the other half-enol ($\alpha_2\beta$ -ester), m. 20° , do not bind Br. Through an investigation of alc. solns. of A it is shown that the error in the indirect titration is the result of a splitting off of HBr because of the use of aq. KI. The use of alc. KI gives satisfactory results. The combination of the colorimetric and the titrimetric methods, in the case of the alc. equil. of A, gives a further insight into the mechanism of this equil. The transformation of the diketo form and the $\alpha_1\beta$ -ester proceeds through the $\alpha_1\beta$ -ester. This is represented schematically as follows:



The detd. amts. of the isomers in alc. in equil. were confirmed by the prepn. of a similar soln. from weighed amts. of the pure isomers. These values are: 10% γ , 30% β , 16% $\alpha_1\beta$ - and 44% $\alpha_2\beta$ -ester.

C. J. WAST

Oxidation of carbohydrates with nitric acid. PAUL HAAS AND BARBARA RUSSELL-WELLS. *Biochem. J.* 16, 572-73(1922).—Oxidation of the common di- and monosaccharides with HNO_3 yields, among other things, a substance (or substances) that reduces Fehling soln. (see Kiliani, C. A. 16, 2120). Attempts to isolate the substance causing reduction showed that it was not glucuronic acid. BENJAMIN HARROW

Oxidation of several sugar acids. WILHELM GREINERT. *Ann.* 429, 153-63(1922).—Since in the oxidations of the sugar acids mesotartaric acid (A) has never been observed, it seemed desirable to reinvestigate the products of such oxidations. In general the results confirmed earlier investigators. A possible explanation of the failure to isolate

A may be its susceptibility to oxidation. When 2 g. each of *d*- and mesotartaric acids were treated with 2% alk. KMnO_4 1.1 g. of the *d*-acid were recovered but only 0.6 g. of the meso-acid. The oxidation of a mixt. of 6.96 g. mannosaccharic acid and 0.4 g. A with the theoretical amt. of alk. KMnO_4 completely destroyed A. Mucic, *d*-saccharic and *d*-mannosaccharic acids were studied.

C. J. WARR

The graphite conception of aromatic carbon. A. L. v. STEIGER. *Ber.* 55B, 1968-79 (1922).—Reply to v. Auwers (*C. A.* 16, 860), Wibaut (*C. A.* 16, 2059) and v. Weinberg (*C. A.* 15, 73). It is true that, as pointed out by v. A., the value for $[M]$ for C_{10}H_8 used by v. S. was too low, but after redetg. this const. for C_{10}H_8 , Ph₂, anthracene and phenanthrene on carefully purified materials, he finds that the values calcd. by his method of summation of C-C and C-H unions still agree better with the observed values than those calcd. by the Brühl method. The C_{10}H_8 , a "Naphthalin puriss. alkohole dep. Merck," was subjected to a preliminary treatment according to Lunge (*Ber.* 14, 1756 (1881)), purified 3 times by Stenhouse and Groves' method (heating 2 hrs. at 180° with a few % of concd. H_2SO_4 and distg. with steam), distd. twice over Na, again treated according to S. and G., dried *in vacuo* over H_2SO_4 and distd. from Na *in vacuo*; it then h. 80.04° (corr.), d_4^{20} 0.9757, n_D^{20} 1.58996, $[M]_D^{20}$ 44.29 at 85.30°. The Ph₂, a Merck "purissimum" prepn., was fused 1 hr. over Na and distd. *in vacuo* from fresh Na; it showed d_4 0.9890, n_D 1.587285, $[M]_D$ 62.38 at 77.14°. The anthracene, distd. with steam, crystd. from 96% alc. and dried over H_2SO_4 , showed in 7.9765% soln. in the above C_{10}H_8 d_4 0.9773, n_D 1.58932, $[M]_D$ 59.65 at 90.35°. The phenanthrene, a Merck "purissimum" prepn. purified through the picrate, was fused a short time over Na, distd. once *in vacuo* and 3 times with steam, crystd. from 96% alc., distd. with steam, again crystd. from alc. and dried over H_2SO_4 ; in 8.539% soln. in the above C_{10}H_8 it showed d_4 0.9800, n_D 1.59427, $[M]_D$ 62.68 at 87.65°; in 43.126% soln. d_4 1.0062, n_D 1.61844, $[M]_D$ 62.64 at 88.42°.

C. A. R.

Phenyltaurine and its higher homologs. R. DEMARS. *Bull. sci. pharmacol.* 29, 429-5 (1922).—The PhNH_2 salt of phenyltaurine was prepd. according to the method of James (*J. Chem. Soc.* 47, 367 (1885)). Phenyltaurine was obtained from this compd. by decomp. of the aniline hydrochloride with $\text{Ba}(\text{OH})_2$ and steam distn. The residual liquor contained BaCl_2 and the Ba salt of phenyltaurine. The Ba was pptd. out by the addn. of the necessary amt. of H_2SO_4 as detd. by analysis of an aliquot. The filtrate contg. HCl and phenyltaurine was evapd. on the water bath to dryness and rapidly washed 3 times with 95% alc. to remove the last traces of the acid. The phenyltaurine was then recrystd. from H_2O and alc. Normal methyl- and ethylphenyltaurine were similarly prepd.

F. S. HAMMETT

The resolution of phenoxypropionic and *o*-nitrophenoxypropionic acids. R. FOURNEAU AND G. SANDULESCO. *Bull. soc. chim.* 31-32, 988-93 (1922).—In the study of the resolution of phenoxypropionic acid (A) and of nitrophenoxypropionic acid (B), made to provide active acids for therapeutical uses, there were tried 7 of the best known alkaloids, without result; the salts were either non-cryst., or much too sol.; only yohimbine (C) was successful in producing resolution. 39 g. $\text{C}_6\text{H}_5\text{Cl}$ in 2 l. hot H_2O was pptd. with NH_4OH ; the ppt. was sharply sepd. from the mother liquor, washed well and, still moist, added to a mixt. of 1.5 l. H_2O and 0.35 l. EtOH at 90°; to this mixt. was added 16.6 g. A, and the whole brought to boiling, at which temp. all dissolved. After standing a few mins. only, an abundant pptn. took place; the mixt. was cooled 3 days, the solid sepd., washed with H_2O and dried at 50°. Yield, 21 g. dry yohimbine salt (D), 81% of theoretical. 20 g. dry D gave a recovery of 11.8 g. after crystn. from 1.5 l. H_2O with 0.13 l. EtOH . A soln. of purified D was neutralized with NaOH , the pptd. C filtered off, the filtrate acidified with HCl and *d*-phenoxypropionic acid (E) extd. with Et_2O ; after isolation it was crystd. from a little H_2O , in needles 3-5 cm. long.

The crude product had α 1.10° in a 15-cm. tube, 1% solu. in abs. EtOH, at 21° [α]_D 36.6°; after the 1st crystn., 39.3°, which was not changed by a 2nd crystn. *dl*-1,2-Nitrophenoxypropionic acid (F), m. 157° (cf. Ber. 33, 925, 1593) may be resolved with either C or cinchonine (G). The crude G salt (H) from 42.2 g. F and 58.8 g. G was prep'd. in dil. EtOH with a 45 g. yield. The once recrystd. salt is treated with NH₄OH; the free acid prep'd. as above is sometimes oily. The crude *d*-acid (J) has [α]_D 160°; after 1 crystn., 166.25°, not changed by a 2nd crystn. The mother liquor from H, contg. the G salt of *l*-nitrophenoxypropionic acid (K), after treatment with NH₄OH to ppt. G is made slightly acid with HCl and evap'd. *in vacuo*; the crude K is extd. with Et₂O and crystd. from H₂O; it has [α]_D -116.6° after 1 crystn., and -110.8° after 2 crystns. Recombination with C yields K having [α]_D -166.0°. If the resolution be carried out from the start with G, the mother liquor from the *d*-salt, on evapn., gives K which shows, after the 2nd crystn., [α]_D -166.25°. Contrary to general experience, the *l*- and *d*-acids, each m. 111-2°, show a lowering of m. p. with increasing purity. A mixt. of equiv. amts. of *d*- and *l*-acids, made by grinding the 2 together, m. 156-7°. In the same way, *dl*-A m. 115°, while both *d*- and *l*-A m. 87°; there is no evidence of hydrate-formation. The investigation is being extended to *m*- and *p*-nitrated acids.

A. R. ALBRIGHT

Derivatives of dulcin. PAUL HERRMANN. *Ann.* 429, 163-74 (1922).—Since *o*-MeOC₆H₄CO₂Na has a sweet taste, it is possible that derivs. of dulcin in which the CO₂H group is ortho to the EtO group might be sweeter than dulcin. This does not appear to be the case. *2-Methoxy-4-carbamylbenzoic acid*, from MeO(H₂N)C₆H₄CO₂H and KCNO in H₂O, fine needles, m. 202-3°, sol. in 125 parts hot H₂O and in 400 parts at 15°. FeCl₃ gives a deep bluish violet color. *Sodium salt*, powder, easily sol. in H₂O; the alc. soln. has a slightly sweet taste, hut the aq. soln. is tasteless. The *ethyl ester* forms fine glistening needles, m. 191-2°, sol. in 150 parts of boiling H₂O and having a bitter taste. When MeO(HCl.H₂N)C₆H₄CO₂H is heated with CO(NH₂)₂ in H₂O, *di-[2-methoxybenzene-2-carboxylic acid-4]-urea* results, m. 243° (decompn.). The *sodium salt* is very sol. in H₂O. *Thiocarbamyl derivative*, MeO(H₂NCSNH)C₆H₄CO₂H, thick crystals, m. 205-6°, with an acid taste. *2-Ethoxy-4-carbamylbenzoic acid*, small needles, m. 195-6°, sol. in 40 parts hot and 660 parts H₂O at 15°. The H₂O or EtOH soln. has an acid taste. FeCl₃ gives a bluish violet color. *Sodium salt*.—*Ethyl ester*, m. 179.5-80.5°, sol. in 120 parts boiling H₂O, nearly insol. in cold H₂O. FeCl₃ gave no color. *Thiocarbamyl derivative*, small needles, m. 182-3°, sol. in 90 parts boiling H₂O. *1-Ethoxynaphthalene-4-urea*, small needles, m. 205-7°, m. 204-5° (decompn.). The alc. soln. has a bitter taste. The *4-thiourea derivative* also forms small needles, m. 210-1.5°, and has a bitter taste.

C. J. WEST

Bromotrinitromethane. I. ERICH SCHMIDT, WALTER BARTHOLOMÉ AND ALFRED LÜBBE. *Ber.* 55B, 2099-107 (1922).—Just as the NO₂ group can be introduced into aromatic residues by means of tetranitromethane (C. A. 15, 86), so Br can be introduced by means of bromotrinitromethane (A), and in the presence of alcs., ROH, A converts olefinic compds., -CH:CH-, into the compds. -CH(OR)CHBr- + CH(NO₂)₂-, the substance -CH[O.N.O.C(NO₂)₂]CHBr- probably being an intermediate product

(cf. C. A. 17, 57). To the unsatd. compd. in alc. in ice or on the H₂O bath is added, dropwise, 1 mol. A and the mixt. either allowed to stand in ice or refluxed until the odor of the A has disappeared, then shaken with H₂O, satd. with NaCl and extd. twice with Et₂O; the ext. is shaken 2 hrs. with 15% NaOH (300 cc. for 23 g. A), then 2-3 times more with 300 cc. of 15% KOH, washed with H₂O and dried over Na₂SO₄. PhCH-(OMe)CHBrMe (9 g. from 11.5 g. A and 5.9 g. PhCH:CHMe in 30 cc. MeOH allowed to stand 24 hrs. in ice and heated 9 hrs. on the H₂O bath), b₁₁ 110-1°. α -Ethoxy- β -bromopropylbenzene, similarly obtained in 56% yield in EtOH instead of MeOH, b₁₁

119-20°. *o*- α -Methoxy- β -bromodihydroanethole (10 g. from 11.5 g. A and 7.4 g. *o*-anethole in 40 cc. MeOH after standing 24 hrs. in ice), $b_{0.2}$ 100°; α -allyloxy compound (yield, 77.9%), $b_{0.31}$ 113°. *p*-MeOC₆H₄CH(OMe)CHBrMe (yield, 84.2%), $b_{0.21}$ 105°, $b_{0.21}$ 108°; α -EtO compd. (yield, 74%), $b_{0.21}$ 110-2°; α -allyloxy compound (yield, 74.4%), $b_{0.3}$ 126-7°. 3,4-CH₃O₂C₆H₃CH(OMe)CHBrMe (11.9 g. from 8.1 g. isosafrole and 11.5 g. A), $b_{0.11}$ 108-10°; α -EtO homolog (yield, 79.4%), $b_{0.2}$ 119-20°; if, instead of alc., petr. ether or AcOH is used as the solvent, there is obtained an *isosafrole-bromotrinitromethane addition product*, C₁₇H₁₉O₃N₃Br (3.5 g. from 2.3 g. A and 1.6 g. isosafrole in 10 cc. petr. ether after 24 hrs. at 0°), yellow crystals from MeOH, decomp. 100-1°, is not stable on standing. *2-Bromocyclohexyl methyl ether* (16.2 g. from 23 g. A boiled 9 hrs. with 8.2 g. cyclohexene in 60 cc. MeOH), b_{12} 78-9°, n_D^{20} 1.4910, d_4^{25} 1.3400. *Ethyl ether* (yield, 58%), b_{10} 84-5°, n_D^{20} 1.4818, d_4^{25} 1.2751; *allyl ether* (7.2 g. from 11.5 g. A and 4.1 g. cyclohexene allowed to stand 48 hrs. in 30 cc. allyl alc. in ice), b_H 100-1°. *Bromomethoxy- β -menthanol* (9.5 g. from 11.5 g. A and 7.8 g. crystd. terpineol in 40 cc. MeOH after 24 hrs. in ice and 2 hrs. on the H₂O bath), $b_{0.21}$ 110-1°. *Dibromodimethoxymenthane*, obtained in the same way in 8.3 g. yield from 15.3 g. A and 4.5 g. *l*-limonene in 60 cc. MeOH, $b_{0.3}$ 136° (owing to the sensitiveness to alkali of this compd., its Et₂O soln. is treated first with 100 cc. of Na₂CO₃ and then with 50 cc. of 5% K₂CO₃ instead of with NaOH and KOH). *Methyl bromomethoxystearate*, obtained in 5.4 g. yield from 4.1 g. A and 5 g. oleic acid in 30 cc. MeOH (the Et₂O soln., instead of being treated with alkalis, is washed 5 times with H₂O), $b_{0.31}$ 192°. *Bromomethoxytetrahydronaphthalene* (8.8 g. from 11.5 g. A boiled 24 hrs. with 6.5 g. Δ^1 -dihydronaphthalene in 30 cc. MeOH), $b_{0.31}$ 101°; *isomer from Δ^2 -dihydronaphthalene*, obtained in 70.6% yield (the Et₂O soln., after the alkali treatment, is shaken 24 hrs. with 50 cc. of 20% Hg(OAc)₂ to remove unchanged dihydronaphthalene, then 2 hrs. with 150 cc. of 15% KOH), $b_{0.1}$ 115°.

C. A. R.

Tendency to migration of acid esters in the acyl derivatives of the phenylhydrazones of hydroxyketones. K. v. AUWERS, E. HILLIGER AND E. WULF. *Ann.* 429, 190-246 (1922); cf. C. A. 3, 902, 1987, 1988.—*o*-Propio-*p*-cresyl acetate, by the use of Ac₂O and AcONa, short needles, m. 58°. Attempts to prep. the phenylhydrazone always resulted in the splitting off of the Ac group, with the formation of *propiocresol phenylhydrazone* (A), light brown needles, m. 146°. *Benzoate*, compact prisms, m. 97°. Attempts to acylate the phenylhydrazone (AcCl, BzCl) always gave smeary products, from which no definite product could be isolated. *Benzoate oxime*, small, quadratic prisms, m. 138-8.5°, in very poor yield. The Ac deriv., treated with NH₂OH, gave *propiocresol oxime*, m. 134-5°. The benzoate anil could not be obtained, but *propiocresol anil* was readily obtained as yellow needles, m. 106-7°. Attempts to benzoylate this gave only the benzoate of the ketone. The anil reacts with PhNHNH₂ in alc. to give a 70% yield of A. *p*-Nitrophenylhydrazone, orange-red, glistening, flat needles, m. 187-8°, obtained from the free ketone and its Ac deriv. The Bz deriv., however, gave the *benzoate p*-nitrophenylhydrazones, long, yellow, felt-like needles, m. 159-60°. Rearrangement expts. (boiling with AcOH for 1, 3 or 8 hrs.) gave products which did not melt constantly. *o*-Propio-*p*-cresol phenylhydrazone *O*-benzoate (B), by the reaction of PhNHNH₂ and the Bz deriv. in the presence of a little concd. HCl, short prisms, m. 92°. Reduced, this yields PhNH₂ and *o*-[α -aminopropyl]-*p*-cresyl *N*-benzoate, needles, m. 145-6°. B, heated with AcOH for 16 hrs., gave AcNHNBzPh, m. 152°, and α -[3-methyl-6-hydroxyphenyl]- β -methylindole *O*-benzoate, obtained in better yield by the action of BzCl upon A, or by heating B with fused ZnCl₂ 5 min. at 175°, needles, m. 176°. Expts. with A gave only PhNHNH₂·HCl. The action of BzCl upon Ph₃C:NNHPh or 1,4-(HO)MeC₆H₃OAc gave PhNBzNH₂, m. 177°, but no trace of an indole deriv. *Acetophenone benzoylphenylhydrazone*, fine wax-like needles, m. 125.5°. *4-Methyl-7-hydroxy-*

1-hydrindone acetate, needles, m. 107°. With PhNHNH₂ this gives an 85% yield of the *phenylhydrazone O-acetate*, small rhomboids, m. 226°, sapond. by heating 0.5 hr. with alc. NaOH. Boiling with 5 parts AcOH for 15 min. gave the *N-acetate*, also prepd. from the free ketone and PhNHNH₂, prisms, m. 130–1°. FeCl₃ gives a dirty, bluish green color in alc. but no color in concd. H₂SO₄. Reduction with Zn dust and AcOH gives PhNHAc. The *O,N-diacetate* results from the *N-Ac* deriv. of the free PhNHNH₂ deriv., fine needles, m. 132.5°, gives no color with FeCl₃. Reduction with Zn and AcOH gave PhNHAc and *1-amino-4-methyl-7-hydroxyhydrindone N-acetate*, m. 158°. The Bz deriv. is best prepd. by heating the ketone and BzCl at 170–80°. With PhNHNH₂ it yields the *phenylhydrazone O-benzoate*, small rhomboids, m. 247°. After boiling 3 hrs. with AcOH about 0.5 is unchanged. *N-Benzoate*, short needles, m. 115–6°, results in 60% yield from the ketone and PhNBzNH₂ and is sepd. from the *O-Bz* deriv. by extrn. with alc., in which the latter is insol. Heated with 20 parts of equal vols. of AcOH-EtOH for 2 hrs., about 0.1 is transformed into the *O-Bz* deriv. The *phenylhydrazone O-benzoate N-acetate* is formed in 40% yield when the *O-Bz* deriv. is treated with PhNHNH₂, m. 192–2.5°. Reduction gave PhNHAc and *1-amino-4-methyl-7-hydroxyhydrindone N-benzoate*, flat needles, m. 166–8°. The *O-acetate N-benzoate* forms small, flat glistening needles, m. 152.5–3.5°. *p-Nitrophenylhydrazone*, brick-red powder, m. 298° (decompn.). *O-Acetate*, yellow powder, m. 204 5° (decompn.). *O-Benzoate*, yellow, m. 299° (decompn.). Anil, yellow needles, m. 88–9°; concd. H₂SO₄ gives a green soln., while alc. FeCl₃ soln. gives a bluish green color. PhNHNH₂ in alc. at 50° gives a good yield of the hydrazone. *Oxime*, small wax-like needles, m. 140°, whose *dibenzoate*, small, glistening needles, m. 186.5 7.5°. The oxime in alc. is reduced by Na-Hg to *1-amino-4-methyl-7-hydroxyhydrindone*, isolated as the *dibenzoate*, fine needles, m. 150°. *4-Methyl-7-methoxyhydrindone phenylhydrazone*, glistening yellow rhomboids from MeOH or pure white scales from EtOH, m. 150–2°, both forms losing PhNHNH₂ on standing; *p-nitrophenylhydrazone*, orange-yellow microneedles, m. 215°. *4-Methyl-7-hydroxyhydrindone methylphenylhydrazone*, yellowish prisms, m. 83–5°. *2,4-Dimethyl-7-hydroxyhydrindone phenylhydrazone*, fine needles, m. 136.5°. *Acetate*, needles, m. 91.5–2°. *Phenylhydrazone O-acetate*, pale yellow, rhombic tables, m. 184.5–5.5°. *Benzoate*, needles, m. 113°. *Phenylhydrazone O-benzoate*, small pale yellow rhombic plates, m. 232°. No definite product could be isolated from the rearrangement mixt. *Phenylhydrazone O-benzoate N-acetate*, fine yellow prisms, m. 171°. *Phenylhydrazone N-benzoate*, spears, m. 133–5°. *3,4-Dimethyl-7-hydroxyhydrindone phenylhydrazone*, fine leaflets, m. 166.5–7.5°. *Acetate*, short prisms, m. 135°. *Benzoate* monoclinic prisms, m. 106°. *Phenylhydrazone O-acetate*, pale yellow needles, m. 210–1°. *O-Benzoate*, short prisms, m. 221–2°. Rearrangement gave the *N-benzoate*, needles, m. 147–8.5°. *O-Acetate N-benzoate*, short, fine needles, m. 176.5 7°. Partial sapon. gave the pure *N-Bz* deriv. *p-Hydroxyhydrindone benzoate*, powder. *Phenylhydrazone*, brown, glistening crystals, m. 165–6°. *O-Benzoate*, brown, glistening leaflets, m. 180–1°. *N-Benzoate*, m. 227°.

C. J. WEST

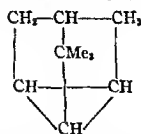
The constitution and tautomeric equilibrium of the two phthalic acid chlorides. ERWIN OTT. *Ber.* 55B, 2108–25 (1922); cf. C. A. 7, 599.—As shown in the section on the tautomeric equil. of the 2 chlorides in this paper, in all the methods of prepg. the high-melting form (A) described in the literature, the low-melting isomer (B) must also have been formed, as temps. above 100° were always used, and it is difficult to see why the B has almost always been overlooked. In the present work it is proved definitely that A has the lactoid or *ω-tetrachlorophthalan* structure, C₆H₄(CCl₂)₂O, and B the acyclic or *benzotrichloride-α-carboxyl chloride* structure, Cl₂CCl₂H₂COCl. This proof is afforded by the greater reactivity of B towards PhNH₂ and MeOH (under the proper conditions A and B also give different products) and by the absorption spectra of the

A and B in the ultra-violet. When B is treated in C_6H_6 with 2 mols. $PhNH_2$ (final concn. of the B, 1 *M*) it immediately reacts with spontaneous evolution of heat according to the equation $B + 2PhNH_2 = Cl_3CC_6H_4CONHPh$ (C) + $PhNH_2 \cdot HCl$ and in a few sec. the soln. changes to a thick magma. Under the same conditions the soln. of A remains perfectly clear for a long time, becomes turbid only very gradually, deposits after 12 hrs. at 15° hardly weighable flocks and requires several weeks for complete sepn. of the $PhNH_2 \cdot HCl$; the reaction proceeds according to the equation $A + 6PhNH_2 = C_6H_4 \cdot CO \cdot NPh \cdot C : NPb$ (D) + $4PhNH_2 \cdot HCl$. The C, owing to its slight

sol., seps. almost completely with the $PhNH_2 \cdot HCl$, the amt. of which is detd. by washing the product with C_6H_6 and Et_2O , drying and weighing, washing out the $PhNH_2 \cdot HCl$ with H_2O and weighing again. As the reaction with B under the given conditions is complete in 0.5 hr., it can be used for the quant. detn. of B in mixts. with A. In the reaction with A no intermediate products could be detected. As C on heating with excess of $PhNH_2$ yields D, Vongerichten, who tried the action of $PhNH_2$ on A and B only at high temps. without a solvent (*Ber.* 19, 1187(1886)), concluded that both A and B react in the same way with $PhNH_2$. In 0.5 *N* soln. in $MeOH$, also, the reaction $B + MeOH = Cl_3CC_6H_4CO_2Me$ (E) + HCl is complete in about 6 hrs. while the reaction $A + 4MeOH = C_6H_4(CO_2Me)_4 + Me_2O + 4HCl$ requires about 24 hrs. for completion. In this case, however, the difference in the velocities of reaction is not sufficiently great to permit of the quant. detn. of B in the presence of A by titrating the HCl formed. The spectra of A and B in $CHCl_3$ show differences similar to those between the spectra of the asym. and sym. chlorides of phthalic acid, but A, having no $C:O$ group left, shows much weaker absorption, relative to A, than does the asym. as compared with the sym-phthalyl chloride. Moreover, the absorption curves of B and asym-phthalyl chloride lie so close together that it may be concluded that their $C:O$ double bonds, as regards their unsatd. nature, stand very close together and must therefore have about the same additive power, a conclusion confirmed by the fact that the const. of the reaction velocities of the 2 compds. towards $MeOH$ are very nearly equal (0.0048 and 0.003, resp.). The reactivity of B, although greater than that of A, is much smaller than that of all other 1,2-dicarboxylyl chlorides hitherto investigated. To det. whether the $o-CCl_3$ group exerts any sterical hindrance on the $COCl$, comparative detns. were made of the velocity of reaction with $MeOH$ and $PhNH_2$ of $BzCl$, $o-MeC_6H_4COCl$, $o-ClC_6H_4COCl$ and $o-Cl_2CHC_6H_4COCl$. $BzCl$ shows a greatly decreased reactivity, the formation of $BzOMe$ in 0.5 *N* soln. in $MeOH$ at 15° requiring more than 0.5 hr. for its completion, the velocity const. being 0.05. An $o-Me$ group does not diminish the reactivity but rather increases it to the limit of measurability, the velocity const. for MeC_6H_4COCl being 0.2-0.3; the introduction of 1 or 2 Cl atoms into the side chain produces no decrease in the reactivity while a 3rd Cl atom produces a very large decrease, the const. for B being only 0.0048. Whenever A or B is fused, an equil., whose position is a function of the temp., is established between the 2 forms; this relation between the temp. and the equil. point has been plotted in the form of a curve. This curve shows that either form can be transformed at will into the other by merely varying the temp. but that A can be transformed only to the extent of about 80% at most into B. The velocity with which the equil. is established is always distinctly measurable, even at high temps., and at low temps. is, in fact, quite small. As shown in the earlier paper, this is characteristic of tautomerism phenomena involving a migration of Cl and not of H , and as a result of the slowness with which the Cl migrates, it has never yet been possible to detect rearrangements of this kind in soln. at room temp. The form of the equil. curve for A and B also indicates that at temps. below 70° the region of existibility of B must cease. This conclusion finds confirmation to this extent: while the pure B, m. 43°, protected from catalytic influences (moisture and consequent

HCl formation), can be kept unchanged (the m. p. did not change in 6 months), yet in the fused state at 57.5° it slowly rearranges into A (after 4 weeks it sintered 38° and m. about 40°); even at 116° the rearrangement is also very slow (after 7 weeks the mixt. still contained 42.88% B while the equil. value for this temp., which is reached in a short time from A, is about 23%). On the other hand, the rearrangement of A into B is much more rapid (at 220°, the equil. point is reached in 0.5 hr.). This great difference may be due, in part, to catalytic influences; while B melts unchanged to a H₂O-clear liquid, A always becomes more or less reddish violet on fusion and at higher temps. (220°) HCl and COCl₂ are evolved. Again, when mixts. of A and B are heated the B apparently rearranges more rapidly than when heated alone. When A was heated 0.5 hr. at 220° and then rapidly distd. under 12 mm. the distillate contained 64.13% B (equil. value for 220°, 64.82%); the mixt. was again heated 1 hr. at 220° and quickly distd. *in vacuo*; it now contained only 50.16% B (equil. value for the temp. (138–45°) of the distn. *in vacuo*, 35–40%); again heated 16 hrs. at 220°, the mixt. before distn. contained 64.34% B, and after another 72 hrs. at 220° and rapid distn. *in vacuo* 64.82%, which was taken as the equil. value for 220°. A mixt. boiled a short time under atm. pressure contained 72.94% B and after 2 vacuum distns. 43.73%; after another 0.5 hr. boiling under atm. pressure (286.5°) it contained 78.94% B. For a practical most nearly complete conversion of the easily available A into B, the A is heated 0.5 hr. at 220°, quickly distd. in the vacuum of a H₂O pump, boiled 0.5 hr. under atm. pressure, cooled as rapidly as possible by pouring into a large porcelain dish and fractionated from low-boiling (50°) petr. ether or under 1 mm.; in the latter case is obtained a H₂O-clear product, the bigger fractions of which may contain as much as 86.5% B. A is obtained in 358 g. yield, together with about 50 g. B, from 377 g. phthalide heated at 100° with 1800 g. PCl₅ until no more POCl₃ dists. over. It m. 85–6° (Vongerichten gives 88°) after repeated crystn. from petr. ether, b_D 90–105°. B m. 43° (V., 47°), b_D 115–20°. The *ω*-dichloro-*o*-toluyl chloride, prep'd. by chlorinating MeC₆H₄COCl at 150° (Katt-winkel, Diss. Bonn, 1914), b_D 133.5–4.9°, m. 29°. Methyl *ω*-trichloro-*o*-toluate (E), b_D 125°. Anilide (C), m. 165–70° (HCl evolution). C. A. R.

Camphenilone group. III. The homogeneity of apobornylene and a new tricyclic hydrocarbon, apocyclene. GUST. KOMPFA AND R. H. ROSCHIER. *Ann.* 429, 175–90 (1922); cf. C. A. 6, 1594.—In repeating the earlier work of K. and Hintikka on the ozonide of apobornylene (A), it was found that the yield was relatively small and that the residue consisted of a new hydrocarbon, apocyclene (B),



A is obtained in fair yields by the distn. at ordinary pressures of C₉H₁₀OCS₂Me. Camphenylamine phosphate, (C₉H₁₇N)₃H₃PO₄, sol. in dil. EtOH. Upon distn. at atm. pressure, 15 g. of phosphate gave only 0.4 g. of a yellow oil, b. 140–4°, which gave a colorless NO comp'd. There was no indication of the formation of A. A ozonide, C₉H₁₄O₃, powder, m. 55° (decompn.); at room temp. it is fairly stable but changes during the course of 6 months into a brown oil. Decompn. of the ozonide in AcOH gave a fraction b_D 87–90° (apocyclene acetate), one b_D 110–20°, which possessed the properties of an aldehyde, but which could not be obtained pure, and a third, b_D 120–80°, which gave apocamphoric anhydride. Addn. of H₂O to the AcOH soln. pptd. B (20–30%), b_D 138–9°, m. 42.5–3°, very stable towards KMnO₄; d₄²⁰ 0.8710; n_D 1.44910, n_D 1.45144, n_F 1.45686, n_T 1.46190 at 40°, mol. refraction (R_L) 37.80. 10 g. A prep'd.

from the xanthate gave 6.2 g. **B**. *Acetate*, by boiling **B** with AcOH and 50% H_2SO_4 for 3 hrs., n_D^{20} 81–2°, d_4^{20} 0.9971, n_D^{20} 1.4601, n_D^{20} 1.4623, n_D^{20} 1.4729 at 20°. On sapon. and oxidation of the resulting alc. there result *apofenhocamphoric acid*, $\text{C}_8\text{H}_{10}\text{O}_4$, monoclinic prisms, m . 144–5°, and *dl- β -fenhocamphorone*, isolated as the *semicarbazone*, needle-like prisms, m . 200–1° (?). Cf. *C. A.* 11, 3276. C. J. WEST

Constitution of the carbonium dyes and halochromism. HUGO KAUFFMANN. *Ber.* 55B, 1967–8(1922).—K. claims priority over Hantzsch for the conception and formulation of Ph_3CH dyes and other halochromic compds. as complex salts. C. A. R.

Correction of the views of Messrs. H. E. Fierz and F. Kehrman on the nature of the carbonium salts. A. HANTZSCH. *Ber.* 55B, 2043–48(1922).—Answer to F. (*C. A.* 16, 2504) and K. (*C. A.* 16, 2683), and also to Dilthey (*C. A.* 16, 3900). C. A. R.

Fluorene series. VII. Dibenzofluorene. A. SIEGLITZ and H. JASSOY. *Ber.* 55B, 2032–40(1922); cf. *C. A.* 16, 1088.—On attempting to decomp. [fluorenyl-9-methyl]urethan (**A**), $(\text{C}_6\text{H}_5)_2\text{CHCH}_2\text{NHCOC}_2\text{Et}$, into the amine $(\text{C}_6\text{H}_5)_2\text{CHCH}_2\text{NH}_2$, which it was intended to convert into *dibenzofluorene* (**B**), $(\text{C}_6\text{H}_5)_2\text{C}:\text{CH}_2$, by the Hofmann degradation, S. and J. found to their surprise that 6 g. **A** distd. with CaO in H under 20–30 mm. yielded directly a small amt. (0.2–0.3 g.) of **B**, long needles, m . 46–8°, quickly decolorizes Br in CHCl_3 , can be recrystd. unchanged from a little MeOH by quick work but on standing the soln. soon becomes turbid and deposits insol. high-melting flocks; the solid **B** likewise quickly changes, with absorption of O, into amorphous high-melting products; on oxidation it yields fluorenone. *Picrate*, orange-red, m . 152–3°. In the prepn. of **B** there remains in the neck of the retort an amber-like insol. resin, softens 255°, m . 290°, the compn. of which indicates that it is a polymer of **B**. *Ethyl 2,7-dibromo-9-hydroxyfluorene-9-acetate* (**C**), from 2,7-dibromofluorenone (**D**), $\text{BrCH}_2\text{COC}_2\text{Et}$ and Zn (etched with HBr) in C_6H_6 , leaves from C_6H_5 or ligroin, m . 109–7°, sapond. by hot concd. KOH to the free acid, fine needles from tetralin-PhMe, m . 205–6°, sol. in concd. H_2SO_4 with deep red color and yielding on diln. with H_2O dibromodibenzofluorene-9-carboxylic acid, whose Et ester (**E**), m . 172–3°, is obtained in 13 g. yield by heating at 100° under 18 mm. the **C** prepd. from 16.7 g. of **D**; 6.5 g. of the Et 2,7-dibromofluorene-9-acetate prepd. as described before from **E** gives when refluxed 12 hrs. with 4.2 g. of 90% $\text{N}_2\text{H}_4 \cdot \text{H}_2\text{O}$ 5 g. of the *hydrazide*, needles from alc., m . 247–8°; *acetone hydrazone*, $\text{C}_{18}\text{H}_{16}\text{ON}_2\text{Br}_2$, needles from PhMe, m . 234–5°; *benzaldehyde hydrazone*, needles from xylene, m . 256–7°. [*2,7-Dibromofluorenyl-9-methyl*]urethan, from 2 g. of the hydrazide in 40 cc. AcOH cautiously treated with 0.4 g. NaNO_2 in 20 cc. H_2O , the resulting azide (1.7 g. after drying) being then boiled 8 hrs. with an excess of alc., needles from alc., m . 191–2°. This on distn. with CaO like **A** above yields neither the amine nor 2,7-dibromobenzofluorene (**F**), which, however, was obtained as follows: **D** with MeMgI in Et_2O gives *9-methyl-9-hydroxy-2,7-dibromofluorene*, prisms from C_6H_6 , m . 162–3°, which in boiling AcOH with concd. HCl yields the *9-methyl-9-chloro derivative*, fine needles from alc., m . 182–3°; distn. of this *in vacuo* does not give **F** but 9-methyl-2,7-dibromofluorene, m . 136°, but the **F**, fine needles from C_6H_5 or abs. alc., m . 205–6°, is obtained when the chloride is boiled 5 min. in AcOH; it quickly decolorizes Br in CHCl_3 , forms in AcOH a clear soln. which after several days deposits insol. flocks, is stable for several days *in vacuo*, forms no picrate in alc. *9-Ethyl-9-hydroxy-2,7-dibromofluorene*, from **D** and EtMgBr , rodlets or stout prisms from C_6H_6 , m . 133–4°; *9-ethyl-9-chloro compound*, needles from alc., m . 171°, gives, when refluxed 3 hrs. in AcOH, *ω -methyl-2,7-dibromodibenzofluorene*, woolly needles from AcOH, m . 130–1°, decolorizes Br in CHCl_3 and is stable indefinitely. *9-Propyl-9-hydroxy-2,7-dibromofluorene*, obtained in only 0.3 g. yield, together with higher melting substances, from 1 g. Mg, 3 g. PrBr , 15 cc. Et_2O and 5 g. **D**, hard plates from MeOH, m . 150–1°. *2,7-Dibromo-9-hydroxyfluorene*, from **D** with Al-Hg in moist Et_2O , needles from AcOH,

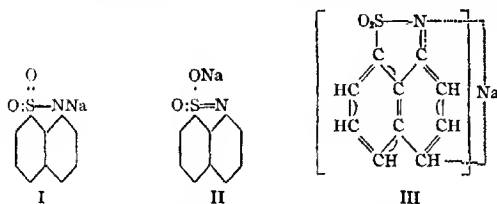
m. 168°. [*o*-Benzal-2,7-dibromofluorene]-2'-carboxylic acid, $(C_6H_3Br)_2C:CHC_6H_4CO_2H$ (0.2 g. from 1 g. **D** and 0.46 g. *o*-OHCC₆H₄CO₂H in boiling alc. with 0.5 g. Na), yellow needles from AcOH, softens 218°, m. 224°; *ethyl ester*, melted yellow needles, m. 140°. 3',4'-Dimethoxy [*o*-benzal-2,7-dibromofluorene]2'-carboxylic acid, from opianic acid and **D**, dull yellow microrodlets from AcOH, m. 249-50°; *ethyl ester*, deep yellow spears from alc., m. 135°, reduced by activated Al in Et₂O to the *dihydro ester*, needles from alc., m. 90°. C. A. R.

Cleavage of (1,1-diphenylethyl-2)-urethan. A. SIEGLATZ. *Ber.* 55B, 2049-2 (1922); cf. preceding abstr.—In order to det. whether it is possible to bring about with other urethans a cleavage similar to that of $(C_6H_5)_2CHCH_2NHCO_2Et$ which, on distn. with CaO, does not give the expected amine but $(C_6H_5)_2C:CH_2$, [1,1-diphenylethyl-2]-urethan (**A**) was likewise distd. with CaO and in this case the expected amine was obtained. 3,3-Diphenylpropionic hydrazide (6 g. from 17 g. Ph₂CHCH₂CO₂Et boiled 24 hrs. with 10 g. of 50% N₂H₄·H₂O in 25 cc. abs. alc.), leaflets from C₆H₆-ligroin, m. 127-8°; *anisal derivative*, fine needles from AcOH, m. 196°. **A** (2.2 g. from 4 g. of the hydrazide in 15 cc. of 15% HCl and 60 cc. H₂O at 0° treated with 1.3 g. NaNO₂ in 20 cc. H₂O, the resulting azide being taken up in Et₂O, dried 24 hrs., treated with 25 cc. alc., cautiously freed from the Et₂O and boiled 3 hrs.), needles from ligroin, m. 69°; if, in boiling the azide, alc. contg. H₂O is used, there is formed, besides the **A**, the *urea*, C₂₀H₁₅ON₂, fine needles from alc., m. 198°. **A** (10 g.), distd. in H under 12 mm. from 30 g. CaO, gave 2 g. Ph₂CHCH₂NH₂ (HCl salt, m. 253°; *picrate*, yellow warts, m. 212-3°); fractionation of the accompanying non-basic products yielded no substance having the b. p. of Ph₂C:CH₂. C. A. R.

Hydrogenation of 1,6-dimethylnaphthalene. F. MAYER AND THERESE SCHULZE. *Ber.* 55B, 2164-7 (1922).—From 50 g. 1,6-C₁₀H₈Me₂ (**A**) in 600 g. boiling AnOH treated twice with 60 g. Na in small portions is obtained 25 g. Δ^{2,3}-5,8-dihydro-1,6-dimethylnaphthalene, b₁₀ 118°, d₁₈ 0.9700; 4.11 g. in CHCl₃ treated with Br until the color persists (3.99 g.) yields an oily dibromide which on distn. *in vacuo* loses HBr with formation of **A**. 5,6,7,8-Tetrahydro-1,6-dimethylnaphthalene (**B**) (3.7 g. from 8 g. of the dihydro compd. in 130 cc. alc. and 35 cc. H₂O, 5 cc. PdCl₂ (1:1000) and 1 g. animal charcoal shaken with H under 1.6 atms.), b₁₀ 110-1°, d₁₈ 0.9487, converted by heating 1 g. 6 hrs. at 150-50° with 3 cc. HNO₃ (d. 1.51) and 2 cc. H₂O into 1,2,3-C₆H₃(CO₂H)₃. Hydrogenated with 8 g. of a Ni catalyst in an autoclave at 240° under 20-5 atms., **A** yields a product, C₁₂H₁₆, b₁₀ 108-10°, d₁₈ 0.9504, which with HNO₃ at 150° gives a mixt. of 1,2,3- and 1,2,4-C₆H₃(CO₂H)₃ and which must, therefore, itself be a mixt. of **B** and the 1,2,3,4-tetrahydro deriv. C. A. R.

Mechanism of the coupling reaction. II. 1,8-Naphthasultam and its N-methyl derivative as azo components. W. KÖNIG AND K. KÖHLER. *Ber.* 55B, 2139-49 (1922); cf. C. A. 15, 3288.—It was shown in the 1st paper that certain aromatic acylamines can couple with reactive diazo compds. to normal azo compds., whence it was concluded that this reaction of such "carbacylamines" differs from the relatively rapid coupling of certain N-arylsulfonamides ("sulfacylamines") only in its velocity and not in its inner mechanism, and it was further assumed that all these acid amides couple analogously to the phenols, *i. e.*, that it is only the hypothetical enol, ArN:C(OH)R, or sulfenol, ArN:S(O)(OH)R, forms which permit of the entrance of the diazo residue into the aromatic nucleus by way of the HO group and the concomitant conjugated chain. The study of 1,8-naphthasultam (**A**), however, has shown that this view is incorrect, for even the N-Me deriv. (**B**) of **A** couples with diazotized *p*-O₂NC₆H₄NH₂ in several weeks, with diazotized 2,4-(O₂N)₂C₆H₃NH₂ in a few hrs.; *i. e.*, **B** behaves exactly like an α-naphthol alkyl ether, only more slowly. In view of these facts the assumption that **A**, whose analogy in structure to **B** is shown by the absorption spectra of **A** and **B**,

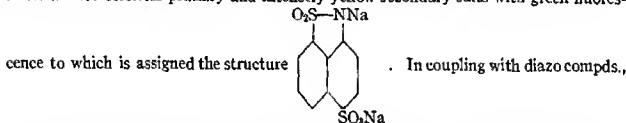
reacts in the coupling reaction in the sulfenol form becomes untenable. This is confirmed by the fact that the spectrum of the Na deriv. of A bears the same relation to that of A that the spectrum of the Na deriv. of α -naphthol bears to that of the naphthol and hence the two Na derivs. must have analogous structures, i. e., the Na deriv. of A must have the structure I, not II. Naturally, the formula I does not indicate the peculiarly altered, "meriquinoid" (so to speak) state which is apparently established in the C_6H_4 nuclei of all phenols on salt formation. This is best shown by the conjunction formula III (and the corresponding formula for the Na deriv. of α -naphthol), which is



indirectly confirmed by the striking similarity in the absorption curves of these Na compds. to that of aq. K dinitromethane (Hedley, *C. A.* 2, 2373). This view of the analogous structure of phenolates and salts of A is naturally also applicable to the alkali salts of the "open" sulfacylamines aod, owing to the coupling power of the carbacylamines, also to the salts of the latter. The peculiar indifference (which has been confirmed) of α - $C_{10}H_7NMeSO_3C_6H_4Me(p)$ (C) towards diazo compds. may be due to the fact that the $MeC_6H_4SO_3$ group, freely mobile on the N atom, exercises, owing to the large vol. in space it occupies, a steric hindrance on the first step in the coupling, which, according to Karrer (*C. A.* 9, 3239), consists in an addn. of the diazo compd. to the auxochrome group of the azo component. A 2nd explanation is that in B the N atom has available more affinity than in C; in B chiefly only one O atom of the SO_3 group can, by spherical radiating valence, rob the N atom of a certain amt. of affinity, while in C both O atoms of the freely rotating $MeC_6H_4SO_3$ group can so rob the N atom. *N-Acetylnaphthasulfam* (Dannert's supposed sulfenol form of A or "isoonaphthasulfam;" *C. A.* 1, 2884) can couple just like the O-Ac derivs. of phenols and its absorption curve corresponds to that of acetyl- α -naphthol, showing the pronounced negative color effect which is a general characteristic of phenols and amines acylated on the auxochrome. B, very faintly yellowish needles from alc., m. 125°, is obtained in 75% yield from the Na deriv. of A in H_2O and a few drops of NaOH shaken with 1 mol. Me_2SO_4 with gradual addn. of NaOH to keep the soln. faintly alk. all the time. A suspension of diazonaphthionic acid, prepd. in the usual way and toned down with NaOAc, stirred 0.5 hr. with 1 mol. A in cold dil. NaOH gives *4-[1'-naphthaleneazo]-1,8-naphthasulfam-4'-sulfonic acid*, orange needles, chars 320°, dyes wool in ao acid bath a clear reddish brown; alkalis produce a deep red anionic halochromism. *4-[4'-Nitrobenzeneazo]-1,8-naphthasulfam*, from A in AcOH with 1 mol. concd. $p-O_2NC_6H_4N_2OH$, seps. in a few moments in brick-red needles recrystd. from $PhNO_2$, m. 288-9°, sol. in alc. with yellow color, shows a violet-red halochromism with NaOH. *4-2', 4'-Dinitro compound*, from A and $2,4-(O_2N)_2C_6H_3N_2SO_3H$ in AcOH at 10°, red rhombohedra with very strong light green surface luster from $PhNO_2$, slowly darkens 305°, does not m. 355°. sol. in alc. with yellow color changed to blue by NaOH. *4-[4'-Nitrobenzeneazo]-N-methyl-1,8-naphthasulfam*, obtained in 55% yield after 4 weeks from B and $O_2NC_6H_4N_2OH$ at 0°, red leaflets from AcOH, m. 236-7°, insol. in H_2O and dil. alkali, sol. in alc. with yellow color unchanged at first by cold dil. alkali but changing through violet to blue-violet

on heating, long standing or addn. of much concd. alkali; on long boiling with alkali the color again fades out and finally becomes a faint red. *4*-2', *4'*-Dinitro compound, obtained almost quant. in a few hrs., needles with greenish shimmer from AcOH, m. 263°, sol. in alc. with a yellow color not changed at first by alkali but soon changing to blue and, after long boiling, to green and finally to a faint yellow. *4*-[2', *4'*-Dinitrobenzenesazo]-1-methylaminonaphthalene-8-sulfonic acid, obtained almost instantly from 1,8-C₁₀H₆(NHMe)SO₃H (prepd. by hydrolysis of B with concd. alkali), red microneedles from H₂O, sol. in H₂O with orange color instantly changing with the least trace of alkali to a deep blue, which on long boiling passes through blue-green and green to light yellow. Similar phenomena were observed with the copulation product of 1,8-C₁₀H₆(NH₂)SO₃H with diazotized O₂NC₆H₄NH₂. C. A. R.

1,8-Naphthasultam-4-sulfonic acid and some of its derivatives. W. KÖNIG AND J. KERN. Ber. 55B, 2149-55(1922).—In connection with the work described in the preceding abstr. it became of interest to det. whether the similarity of 1,8-naphthasultam (A) to α -naphthol applies also to its SO₃H derivs. and especially if 1,8-naphthasultam-4-sulfonic acid (B) yields *o*-azo dyes like 1,4-C₁₀H₆(OH)SO₃H (C). Two methods for prep. B have been worked out. Like C, it is very sol. in H₂O and forms 2 series of salts: almost colorless primary and intensely yellow secondary salts with green fluores-



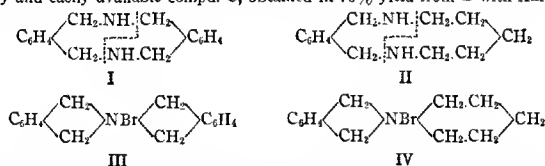
however, it shows a greatly diminished reactivity as compared with either A or C. The mono-K salt is obtained in about 30% yield from 15 g. 1,4,8-C₁₀H₃(NH₂)(SO₃K); refluxed 4 hrs. at 145° with 45 g., POCl₃, cooled, treated with a little ice, filtered, taken up in 100 cc. H₂O and neutralized to tropeolin with K₂CO₃. A better method consists in treating 20 g. A with 10 g. AcOH and 20 g. abs. H₂SO₄, keeping 1 hr. at 50°, pouring upon ice, dilg. with H₂O to 200 cc. and neutralizing to tropeolin, whereupon in about 1 hr. about 18 g. of the mono-K salt seps.; if the filtrate is now completely neutralized, concd. to about 70 cc. on the HeO bath, treated with an equal vol. of alc., filtered from the K₂SO₄ and treated with more alc. and KOH, there seps. on long standing about 2 g. of the di-K salt. Finally, the mono-K salt can be obtained in about 80% yield from 10 g. A stirred with 15 g. abs. H₂SO₄ at 45° until the product is completely H₂O-sol. and then treating as above. Although the yield by this last process is better, the reaction mixt. sometimes becomes so solid that it can no longer be stirred and the yield is greatly diminished. The monopotassium salt seps. in almost colorless prisms with 1.5 H₂O, decomp. about 300°, decomp. carbonates. The dipotassium salt can be heated without the least change up to about 300°; it crysts. best from MeOH in yellow, apparently quadratic tables with 1 H₂O, shows a bright green fluorescence both in the solid state and in very dil. solns., is pptd. from concd. solns. by acids as the mono-K salt. Secondary barium salt, bright greenish yellow leaflets with 4 H₂O; secondary calcium salt, pale yellow-green leaflets with 1 H₂O; free B, very faintly pink, exceedingly sol. needles; chloride (7.5 g. from 10 g. of the mono-K salt and 10 g. PCl₅ heated 1 hr. on the H₂O bath), faintly blue-green leaflets, decomp. above 185°, gives with alkalies the yellow color and the fluorescence characteristic of the sec. salts of B; anilide, from the chloride warmed cautiously with an excess of PhNH₂, tables from alc., decomp. above 230°, is turned yellow by alkalies and couples with diazo compds.; α -naphthalide, from the chloride heated 15 min. at 150° with a slight excess of α -C₁₀H₇NH₂, faintly brownish leaflets from alc., m. about 249° (decompn.), couples more easily than the anilide with diazo compds. 2-[*q'*-Nitrobenzenesazo]-1,8-naphthasultam-4-sulfonic acid

(4 g. from 3.6 g. of the di-K salt stirred several hrs. in H_2O with 1 equiv. of $p\text{-O}_2\text{NC}_6\text{H}_4\text{N}_3\text{OH}$), long felted needles, decomp. 280° , sol. in H_2O and AcOH with red, in alc. with red-violet color, dyes wool in an acid bath a deep brownish red. *2-2'-Methoxy compound* (2 g. after 2 days from the cold diazo soln., toned down with KOAc , from 1.2 g. anisidine and 3.8 g. of the di-K salt), dark violet leaflets, dyes wool a deep Bordeaux. C. A. R.

Methyl ethers of xylan. E. HEUSER AND W. RUPPEL. *Ber.* 55B, 2084-8(1922); cf. C. A. 16, 1082.—With Me_2SO_4 in NaOH xylan never gave products with more than 1-1.5 MeO groups per $\text{C}_6\text{H}_7\text{O}_4$ complex, even after days with the most vigorous stirring. These products dissolve easily and clear in cold H_2O but on heating the soln. becomes turbid and deposits the methyloxylan, which, however, redissolves on cooling; this is probably due to the formation in the cold of a H_2O -sol. hydrate which decomp. on heating. The products are much more sol. in org. solvents than the original xylan, being sol. in cold CHCl_3 and hot alc., very slightly in Et_2O and MeI ; from CHCl_3 , Et_2O in all cases ppts. a substance with a const. MeO content (28.5-29%). Heated with excess of Ag_2O and MeI under a reflux under the pressure of a 25-cm. column of Hg the products obtained with Me_2SO_4 - NaOH yield a substance sol. in MeI and with 38.62% MeO ; extending the length of heating to a week does not raise the MeO , but by heating 3 days in a sealed tube at 100° there is obtained a product which is sirupy at first but becomes solid and pulverizable after heating several days *in vacuo* at 80° and has the compn. of *dimethyloxylan*; it is easily sol. in CHCl_3 , MeI , Me_2CO , AcOH , difficultly in Et_2O , and softens $65\text{--}70^\circ$. C. A. R.

Preparation of dihydroisindole. J. v. BRAUN AND A. NELKEN. *Ber.* 55B, 2059-63(1922); cf. C. A. 16, 3473.—It had been hoped that dihydroisindole (A) might be made conveniently by the method used in prepg. piperazine from *N,N'*-diphenylpiperazine; *N*-phenyldihydroisindole (B), whose prepn. offers no difficulty, can smoothly be nitrated under the proper conditions, but the cleavage of the *nitroso derivative* (C), $\text{C}_6\text{H}_4\text{.CH}_2\text{.N(C}_6\text{H}_4\text{NO).CH}_2$ gives A in only very low yield. It then

occurred to v. B. and N. that the 10- and 11-membered ring compds. I and II obtained by the action of NH_3 on the spiran bromides III and IV (Scholtz, *Ber.* 31, 1700(1898)) might at higher temps. decomp. as shown by the dotted lines into 2 mols. A and 1 mol. A + 1 mol. piperidine, resp. Such proved to be the case; in fact, the I and II need not be isolated; A can be obtained directly by heating III and IV sufficiently long and at a high enough temp. with NH_3 ; III can in the first place be prepd. so conveniently and, secondly, is converted relatively so smoothly into A that the method makes A a rapidly and easily available compd. C, obtained in 70% yield from B with AmNO_2 in



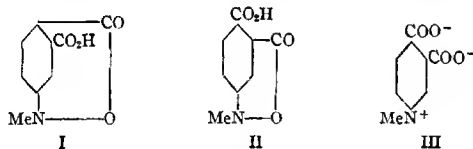
alc. HCl , green powder from $\text{CHCl}_3\text{-Et}_2\text{O}$, m. $286\text{--}7^\circ$, gives with boiling NaOH about 7%, with NaHSO_4 about 10% A. III is obtained in 95% yield from $\alpha\text{-C}_6\text{H}_4(\text{CH}_2\text{Br})_2$ in the least possible amt. of CHCl_3 heated on the H_2O bath with about 3 parts by wt. of 25% aq. NH_3 , treated with bot H_2O until the cryst. magma has dissolved, concd. and cooled. IV is obtained in 90% yield by following Scholtz's directions. As the result of numerous expts. to det. the optimum conditions for prepg. I and II it was found that when IV is heated with 2 parts aq. NH_3 at 200° it gives hardly 20% II, b₁₂ $155\text{--}60^\circ$,

together with somewhat less of a thick oily residue (D), b. 200–70° (decompn.); if, during the heating, the temp. is kept at 175° or 150°, the abs. amts. of II and D are diminished but the relative amts. remain the same. III heated 8 hrs. at 170° with 2 parts of 25% NH₃ gives 50% I, b. 225–30° (S.'s 130–5° is evidently a misprint), and somewhat less of a residue (E), which cannot be distd. without decompn.; if the temp. of the beating is lowered the results are similar to those obtained with IV. I can be characterized through the *p*-nitrobenzoyl derivative, C₁₆H₁₂N₂O₆, m. 167°. Heated, best in the presence of H₂O, in sealed tubes to high temps. the pure I and II give, together with unchanged material and higher boiling products apparently identical with E and D, a lower boiling fraction consisting of A in the case of I and of A + piperidine in that of II. This decompn. always occurs when the temp. is raised above 200°. To obtain A directly the best conditions with IV are 1.5 parts of 25% NH₃ 24 hrs. at 200°; yield of A, b₁₄ 90°, 30%. III, heated 3–4 hrs. at 250° with 2 parts NH₃, gives 25% A and 22% I. C. A. R.

The half-esters of α,α' -dimethylcinchomeronic acid. OTTO MUMM AND ELSK GOTTSCHALDT. *Ber.* 55B, 2064–75(1922); cf. C. A. 12, 1878.—On steric hindrance grounds it had been assumed that the mono-Et ester (A) of α,α' -dimethylcinchomeronic acid (B) which is formed by partial sapon. of the di-Et ester is the β -ester and that the one (C) formed from the anhydride with alc. is the γ -ester, but Wegscheider showed (C. A. 13, 729) that such evidence was not conclusive. Accordingly the β -methyl γ -ethyl ester (D) was synthesized from AcCH:C(OH)CO₂Et (E) and H₂NMe:CHCO₂Me (F) and the isomeric β -ethyl γ -methyl ester (G) from AcCH:C(OH)CO₂Me (H) and H₂NMe:CHCO₂Et (I). If the structures which had been assigned to A and C are correct, partial sapon. of D should give a new β -monomethyl ester (J) and sapon. of G should yield A. Such proved to be the case. Further evidence of the correctness of the above structures is afforded by the fact that the Ag salt of A on dry distn. *in vacuo* gives a small amt. of Et α,α' -dimethylnicotinate (K). Again, esterification of B in abs. EtOH with dry IICl gives C exclusively; with MeSO₃K, the K salt of B gives the di-Me ester, although in poor yield. D, obtained in 11.2 g. yield from 10 g. E and 8 g. F shaken vigorously together in ice, allowed to stand overnight in the ice box, heated a short time on the H₂O bath, extd. with Et₂O and dried 3 days with Na₂SO₄, yellow oil, b₁₂ 158°, m. 22°; *picrate*, tables from alc., m. 143–4°. The methyl β -aminocrotonate (F) was obtained in 8–9 g. yield from 10 g. AcCH₂CO₂Me in 2 vols. cold abs. Et₂O treated with NH₃ and allowed to stand 2 days in the ice chest. G (4 g. from 4 g. H and 3.6 g. I in 3 parts Et₂O allowed to stand 4 days in the ice chest with anhyd. Na₂SO₄), yellowish oil, b₀₋₄₅ 115°, decomps. to a considerable extent on distn. under 13 mm., prisms from petr. ether, m. 52°; *picrate*, branching crystals from alc., m. 137°. The methyl acetone-oxalate (H) was prepd. by dropping 20 g. (CO₂Me)₂ in 10 g. Me₂CO and a little Et₂O into 4 g. Na in 40 cc. cold MeOH, allowing to stand several hrs. in a freezing mixt. and treating the resulting Na salt (25 g. after drying *in vacuo* over H₂SO₄) in the least possible amt. of H₂O at 0° with the calcd. amt. of 5 N H₂SO₄. Dimethyl ester of B, fine needles from petr. ether, m. 48°, is prepd. from 10 g. F and 12.5 g. H in 3 parts MeOH allowed to stand 4 days in the ice box with Na₂SO₄. From D allowed to stand 1 day in the ice box with 1 mol. alc. KOH, evapd. to dryness on the H₂O bath and treated with the calcd. amt. of HCl is obtained J, needles from alc., m. 198–9°, while refluxing 4 hrs. with coned. HCl hydrolyzes it completely to B, whose *hydrochloride*, long prisms with 1 H₂O from dil. HCl, loses HCl and H₂O at 140° *in vacuo*, giving the free B. γ -Monomethyl ester, from the anhydride allowed to stand overnight in cold MeOH, rhombohedral plates from AcOEt, m. 165°. The A obtained by partial sapon. of G sepd. from alc. in fine needles, m. 165°; its *silver salt*, obtained quant. from the ester in H₂O almost completely neutralized with NaOH and pptd. with the calcd. amt. of aq. AgNO₃, gives

on dry distn. *in vacuo* **K**, b_{14} 118°, whose *picrate*, fine needles from alc., m. 139°. **C**, obtained in 3 g. yield from 5.4 g. **B** in EtOH with HCl gas, m. 151–2°, while the K salt of **B** and MeKSO_4 in MeOH heated 7 hrs. at 135° in a sealed tube give, together with a large amt. of decompn. products, the di-Me ester, m. 48°. The affinity consts. of **B** and its mono-Et esters were detd. by the Ostwald method: **A**, $\lambda_{15.12}$ (ν 100) to 43.88 (ν 800), K 0.0019; **C**, $\lambda_{17.41}$ (ν 108.1) to 46.35 (ν 864.8), K 0.0021; **B**, $\lambda_{118.8}$ (ν 87.7) to 269.8 (ν 1403.2), K 0.1666. C. A. R.

Apophyllenic acid and α,α' -dimethylapophyllenic acid. OTTO MUMM AND ELSA GOTTSCHALDT. *Ber.* 55B, 2075–82(1922); cf. preceding abstr.—Up to the present it still remained a question whether apophyllenic acid (**A**) is a γ - or a β -betaine (**I** or **II**). The di-Et ester of α,α' -dimethylcinchomeronic acid (**B**), when converted into the methiodide and then treated with moist Ag_2O in H_2O , gives the *ethyl ester* (**C**) of α,α' -dimethylapophyllenic acid (**D**) and the *methyl ester* (**E**) is obtained in the same way from the di-Me ester of **B**. Now, the β -Me γ -Et ester of **B** on similar treatment yields **E** and not **C**, whence it is concluded that it is the $\gamma\text{-CO}_2\text{H}$ group which is involved in the betaine formation and that **D** (and, by analogy, **A**) has a structure of the type **I**. Nearly all the properties of **A** are in harmony with this view. Only one fact seems to be in contradiction with it, *viz.*, that the Ag salt of **A** gives with MeI the γ -Me ester of the β -betaine (**II**) (Kirpal, *Monatsh.* 24, 519(1903)), but according to Pfeiffer's recent work (*C. A.* 17, 62), betaines, as inner salts, are completely ionized, and the formation of the Ag salt of **A** may be formulated as an ionic reaction between the ions Ag^+ and **III**, so that it is immaterial whether **A** itself is a β - or γ -betaine and the Ag need not necessarily enter the same position as was occupied by the H which it replaces. *Di-ethyl α,α' -dimethylcinchomeronic methiodide* (**F**) (7 g. from 5.4 g. of the ester heated 7 hrs. at 100° with 5.4 g. MeI), pure yellow needles from alc., m. 139°, quant. converted by shaking in H_2O with Ag_2O into **C**, short needles with $2\text{H}_2\text{O}$ from EtOH-Et $_2\text{O}$, m. 112° and, anhyd., 185°. *Dimethyl analog of F* (yield, 94%), fine yellow needles from AcOEt, m. 188–9°. **E**, needles with $3\text{H}_2\text{O}$, begins to darken 205°, decomp. about 255°. *β -Methyl γ -ethyl analog of F* (yield, 86%), fine needles from alc., m. 169–70° (decompn.). **D**, from **C** or **E** boiled 4 hrs. with excess of $\text{Ba}(\text{OH})_2$, needles with $1\text{H}_2\text{O}$ from aq. alc., m. 237–8°; its Ag salt, prepd. by dissolving Ag_2CO_3 in a concd. aq. soln. of the acid and pptg. with Et $_2\text{O}$ -EtOH, gives **E** on long shaking in MeOH with excess of MeI.



C. A. R.

Spirans. X. Proof of the special spiran asymmetry by preparation of an optically active spiran. HERMANN LEUCHS, EVA CONRAD AND HANS VON KATINSKY. *Ber.* 55B, 2131–9(1922); cf. *C. A.* 16, 3089.—Bishydrocarbostyryl-3,3'-spiran (**A**) (cf. paper IX), although it contains no asym. atom, should be capable of existence in 2 enantiomorphous, optically active forms, as, according to theory, the 2 ring planes are perpendicular to each other and the compd. therefore contains no plane of symmetry. **A** itself is not well adapted for resolution expts., as it is a neutral substance; various derivs. of it were therefore prepd. and it was found that the desired resolution could be effected on the di- SO_3H deriv. From 0.556 g. **A** in 88 cc. AcOH with 11 cc. of 0.8 N Br in AcOH on the H_2O bath was obtained 0.785 g. bis-[*p*-bromodihydrocarbostyryl]-

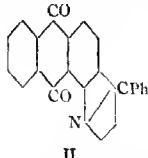
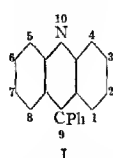
3,3'-*spiran*, quadratic leaflets from AcOH, does not m. 300°, insol. in alkalis or dil. acids, gives no color with alc. FeCl₃, is unchanged by H₂SO₄ at 100°, by long standing with concd. HNO₃ at 20° or by boiling with Cu powder and PhNH₂. *Bis-o,p-dichloro compound* (0.4 g. from 0.556 g. A in AcOH at 80-90° with Cl), leaflets from AcOH, does not change up to 290°, dissolves in about 460 parts hot AcOH. *Bis-p-nitro compound* (0.55 g. from 0.556 g. A heated 1 hr. at 70° with 20 cc. concd. HNO₃ contg. 0.5 g. urea), does not change up to 290°, is very slightly sol. in bot. alcs., from which it seps. in 6-sided leaflets, as also from hot concd. HNO₃, dissolves easily in concd. H₂SO₄, and is repptd. by H₂O, sol. in aq. or alc. KOH with strong yellow color. *Bis-o,p-dinitro compound* (0.75 g. from 0.556 g. A kept 2 days in the ice chest in 6 g. H₂SO₄ and 4 g. HNO₃ contg. 0.5 g. urea), faintly yellowish felted needles from Me₂CO, becomes light brown at 280°, dissolves in about 150 vols. of boiling Ac₂O, is sol. in NH₄OH, alc. and alc. NaOH with yellow, in aq. alkalis with yellow-red color, the solns. depositing bright yellow needles (apparently salts) sol. in hot H₂O. From 5.56 g. A allowed to stand 2 days at 15° in 56 cc. concd. H₂SO₄, poured into 500 cc. ice water, hoiled with BaCO₃, filtered and concd. *in vacuo* is obtained 85% of *barium bis(dihydrocarboxystyryl-6,6'-disulfonate)*, polyhedral and table-like, stout crystals with 8H₂O from H₂O at 0°, prisms with 12-6% H₂O from H₂O-EtOH, forms a faintly acid aq. soln. Free acid (B), 4-sided tables with 26.45% H₂O from HCl, sinters 80°, m. and evolves H₂O at 105-15°, resolidifies at 140-50°, becomes yellow at 220° and foams at 260°; one sample, elongated 5-sided leaflets (probably crystd. from more concd. acid) contained only 18.0% H₂O. When 3.5 g. B (dried at 100°) in 390 cc. MeOH is added to 3.0 quinine + 3H₂O in 1200 cc. boiling MeOH, the amorphous quinine salt seps. on cooling; after 24 hrs. it is redissolved by heating on the H₂O bath and on slow cooling, the crystn. being stopped when about 25% of the salt has sepd. (18-24 hrs.), there seps. 1.57 g. salt which, recrystd. from 156 cc. 1:1 aq. MeOH, yields after 9 days at 10-5° 0.39 g. of long fine needles; this, freed from quinine by dissolving in aq. NH₄OH and shaking with CHCl₃, gives a *diammonium salt* with $[\alpha]_D^{20} = -182^\circ/d$ (about 1.77% soln.), converted by evap. *in vacuo* at 40-50° with a slight excess of Ba(OH)₂ and freeing from the excess of Ba(OH)₂ with CO₂ into the *barium salt*, 4- or 6-sided tablets with 6H₂O, $[\alpha]_D^{25} = -189.6^\circ$ (unchanged by 3 recrystals. from H₂O), which gives the free *l-B*, needles with 6H₂O, sinters slightly 200°, m. 230-5° (decompr.), $[\alpha]_D^{15} = -233.8^\circ$. The quinine salt (9.55 g. from several expts.) sepg. from the MeOH after that of the *l*-acid was likewise converted into the Ba salt which on fractional crystn. from H₂O yielded 7.8 g. inactive salt and finally 0.25 g. of *the barium salt of d-B*, tables with 16% H₂O, $[\alpha]_D^{15} = 192.2^\circ$. Equal parts of the pure *d*- and *l*-Ba salts dissolved in hot H₂O gave a Ba salt identical with that of the original B.

C. A. R.

Reaction of *o*-halogenated ketones with weakly basic amines and synthesis of *meso*-phenylacridine derivatives. FRITZ MAYER AND WALTER FREUND (with KASPAR PFAFF AND HERMANN WERNICKE). *Ber.* 55B, 2049-53(1922).—In an extension of the study of the action of *o*-ClC₆H₄CHO on weakly basic amines, RNH₂ (C. A. 15, 1893, and earlier papers) to *o*-halogenated ketones, ClC₆H₄COR', there have been obtained "imino ketones," RNHC₆H₄COR' (R = *o*-O₂NC₆H₄-, 1-[2-O₂NC₆H₄]- and derivs. of *o*-C₆H₄(CO)₂C₆H₄-; R' = Me or Ph). When R' = Ph, ring closure can be effected, with formation of *meso*-phenylacridine derivs. The same imino ketones can be obtained from the *o*-NH₂ ketones, H₂NC₆H₄COR', and RCl. The halogenated ketones were prepd., where R' = Ph, by the action of *o*-ClC₆H₄COCl on C₆H₅ or its homologs. Where R' = Me, the halogen deriv. of C₆H₅ must be substituted in the *p*-position before the acetylation in order to effect the introduction of the Ac group in the *o*-position to the halogen. It was found, in the course of the work, that the imino ketones obtained from acetylated or benzoyleated *p*-ClC₆H₄Me are different from those obtained from the acy-

lated p -BrC₆H₄Me and that, moreover, the latter are identical with those obtained from the acylated o -BrC₆H₄Me, indicating that the acylation of o - and p -BrC₆H₄Me in the presence of AlCl₃ must proceed in an anomalous manner. The Ac derivs. of the two BrC₆H₄Me yield different oximes, phenylhydrazones and p -nitrophenylhydrazones but the same semicarbazone, while the Bz derivs. yield the same semicarbazone and (apparently) the same oxime. It would seem that the ketones prepd. by the Friedel-Crafts method are mixts. which react selectively with amines and ketone reagents. Since the imino ketone obtained from the Bz derivs. of the two BrC₆H₄Me can form an acridine, the Bz group in the Br ketones must be in the o -position to the Br; debromination of the Br ketones with coppered Zn dust in boiling alc. and subsequent oxidation with CrO₃ in boiling AcOH give in both cases p -BzC₆H₄CO₂H, whence the Me and Bz groups must be in the p -position to each other. o -ClC₆H₄COPh (A) was obtained in 93% yield from 100 g. AlCl₃, 80 g. C₆H₆ and 100 cc. CS₂ allowed to stand overnight with 100 g. o -ClC₆H₄COCl and heated 0.5 hr. on the H₂O bath. From 130 g. p -ClC₆H₄Me in 150 cc. CS₂ treated with 100 g. AlCl₃, then slowly with 100 g. AcCl, warmed to start the reaction, treated with another 50 g. AlCl₃, heated 2 hrs. on the H₂O bath and allowed to stand overnight is obtained 110 g. 5,2-MeClC₆H₃COMe (B), b. 239-40°, oxidized to 4-chlorophthalic acid, m. 293°; oxime, m. 100-1° (Claus, *J. prakt. Chem.* 46, 20 (1892), gives 91°); the condensation product with p -ClC₆H₄CHO m. 105-6°, that with anisaldehyde m. 83-4°. Similar acetylation of 170 g. p -BrC₆H₄Me gives 130-5 g. of a ketone (C) b. 257-8°; oxime, m. 112-4° (C., 109°); semicarbazone, m. 224°; p -nitrophenylhydrazone, m. 173°. From o -BrC₆H₄Me, purified by treatment with Na in Et₂O and b. 183°, is obtained on acetylation 50-70% of a ketone (D), b₃₀ 262-4°, b₂ 132-7°; oxime, m. 104° (mixed with that of C, it m. 80°); semicarbazone, m. 224° (with that of C, 222°); p -nitrophenylhydrazone, m. 203° (with that of C, 183°). As C and D yield the same imino ketone they must both contain 4,2-MeBrC₆H₃COMe. Benzoylation of 130 g. p -ClC₆H₄Me in the heat smoothly gives 110-20 g. ketone (E), m. 35-6°. By benzoylation of 90 g. p -BrC₆H₄Me is obtained 100 g. ketone (F) b₁₂₋₃ 204°; oxime, occurs in 2 forms, m. 143-5° and 100°; semicarbazone, sinters 156°, m. 168-72°. The same ketone is obtained from o -BrC₆H₄Me, and must contain 4,2-MeBrC₆H₃COPh. The imino ketones were prepd. by heating 3 mols. of the halogenated ketone, 1 mol. of the base, 1.5 mols. dry Na₂CO₃, 0.5 g. Cu powder and 20 g. C₁₀H₈ or 40 g. PhNO₂ 2 hrs. at 220° under an air condenser with a Hg seal; the acridines were made by heating 2 g. of the imino ketones with about 15 cc. concd. H₂SO₄ 15 min. on the H₂O bath, pouring into H₂O and pptg. with an excess of NH₄OH. The imino ketone from A and o -O₂NC₆H₄NH₂ was not isolated; the residue from the steam distn. was converted directly into 4-nitro-*g*-phenylacridine, brown-yellow leaflets from C₆H₆, m. 218° (the notation I is used). From A and 2,4-(O₂N)₂C₆H₃NH₂ is obtained 2-[2', 4'-dinitro-anilino]-1-benzoylbenzene, yellow needles from AcOH, m. 161-2°, sol. in concd. H₂SO₄ with red color changing to yellow on heating and giving 2,4-dinitro-*g*-phenylacridine, m. 240°. 2-[2'-Nitro-4'-methylanilino]-1-benzoylbenzene, from 4,2-Me(O₂N)₂C₆H₃NH₂ and A, golden yellow needles from AcOH, m. 125-6°; 2-methyl-4-nitro-*g*-phenylacridine, yellow needles from AcOH, m. 202°, reduced by SnCl₂ and HCl to the 4-amino compound, brown crystals from AcOH, sol. in concd. H₂SO₄ with green fluorescence. 2-[2'-Nitro-4'-chloroanilino]-1-benzoylbenzene, brown-yellow needles from C₆H₆, m. 124-5°, sol. in H₂SO₄ with red color changing to yellow on heating; 2-chloro-4-nitro-*g*-phenylacridine, golden yellow needles from AcOH, m. 251-2°. 2-[2'-Nitronaphthyl-1'-amino]-benzoylbenzene, from A and 1,2-C₁₀H₆(NH₂)NO₂, light yellow needles from AcOH and xylene, m. 273°, sol. in H₂SO₄ with a lemon-yellow color which does not change on heating. 2-[Anthraquinonyl-1'-amino]-1-benzoylbenzene, brown crystals, m. 146°, sol. in H₂SO₄ with a green color changing on heating to red, forms a blue-violet vat, dyes wool and cotton a faint red-violet, is also obtained from o -H₂NC₆H₄COPh and 1-C₆H₄-

(CO)₂C₆H₃Cl. [Anthraquinone-2,1]-*meso*-phenylacridine (II), yellow-brown crystals from PhNO₂, m. 273-4°, forms a violet vat, dyes wool a faint reddish violet; its SO₃H



deriv. dyes wool from an acid bath; nitration gives a mononitro derivative, red-brown crystals from PhNO₂, m. 284-5°, whose vat shows no color change. 2-[2'-Methyl-anthraquinonyl-1'-amino]-1-benzoylbenzene, dark red crystals from AcOH, m. 173°, sol. in H₂SO₄ with a yellow-green color changing on heating to red. Bis-[2'-benzoyl-anilino]-1,5-anthraquinone, from A and 1,5-diaminoanthraquinone, dark red crystals from PhNO₂, m. 248°, difficultly sol. in cold concd. H₂SO₄ with green color changing to red on heating, does not form a vat; [anthraquinone-2,1,6,5]-di-*meso*-phenylacridine, black-blue crystals. The imino ketone from A and 1,2-C₆H₄(CO)₂C₆H₃(NO₂)₂NH₂ could not be isolated; [1-nitroanthraquinone-3,2]-*meso*-phenylacridine, light brown powder, forms a wine-red vat, dyes wool orange-yellow. From o-H₂NC₆H₄COPh were obtained: with PhI, 9-phenylacridine, m. 179-80°; with α-C₁₀H₇Br, followed by ring closure, 9-phenyl-3,4-benzocridine, yellow needles, m. 129°; with β-C₁₀H₇Br, 9-phenyl-1,2-benzocridine, m. 198°. 2-[2',4'-Dinitroanilino]-5-methyl-1-acetylbenzene, from B and 2,4-(O₂N)₂C₆H₃NH₂, orange leaflets from C₆H₆, m. 177-8°, sol. in H₂SO₄ with yellow color, remaining yellow on heating; acridines could not be obtained in this series, although condensation visibly occurred. 2-[Anthraquinonyl-1'-amino] compound, black needles with reddish luster from C₆H₆, m. 209-10°, sol. in H₂SO₄ with green color changing on heating to yellow, depresses the m. p., 212°, of the compound obtained from C to 195°. 2-[4'-Hydroxyanthraquinonyl-1'-amino] compound, black-violet needles from AcOH, m. 237-8°, sol. in H₂SO₄ with green-blue color, changing on heating to amethyst; mixed with the compound, m. 235-6°, from C, it m. 215-6°. 2-[2',4'-Dinitroanilino]-4-methyl-1-acetylbenzene, from C or D, brown-yellow needles, m. 236-40°. 1-Benzoyl analog, from F, orange needles or leaflets, m. 141-3°; 3-methyl-5,7-dinitro-9-phenylacridine, light yellow crystals from AcOH, m. 273°. 2-[2'-Nitro-4'-methyl-anilino]-4-methyl-1-benzoylbenzene, from F and 4,2-Me(O₂N)₂C₆H₃NH₂, red-yellow crystals from AcOH, m. 133.5°; 3,7-dimethyl-5-nitro-9-phenylacridine, light yellow cryst. powder from AcOH, decomps. 241°. 2-[2',4'-Dinitroanilino]-5-methyl-1-benzoylbenzene, from E, yellow needles from ligroin, m. 136-7°, sol. in H₂SO₄ with red color changing to yellow on warming; 2-methyl-5,7-dinitro-9-phenylacridine, needles from AcOH, m. 285-7°, reduced to the 5,7-diamino compound, red-brown needles from 50% alc., sol. in H₂SO₄ with yellow color and brilliant green fluorescence. C. A. R.

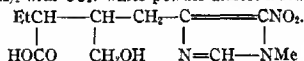
Pilocarpine series. I. Nitropilocarpine and nitroisopilocarpine. MAX AND MICHEL POLONOVSKI. *Bull. soc. chim.* 31, 1027-45(1922); cf. *Ibid* N. S. 48, 219, 1887.—Petit and P. (*Ibid* [3] 17, 557, 702) showed the existence in Jaborandi of 2 isomeric anhydric alkaloids: pilocarpine (A), and isopilocarpine (B). The NO₂ deriv. of each is easily disintegrated, the decompn. products are readily identified and quant. detd. Cf. also Pinner (*Ber.* 33, 1426, 2363; 34, 728, 2459; 35, 198, 2449) and Jowett (*J. Chem. Soc.* 77, 856; 79, 587, 1338; 83, 438) who suggested a constitution of A (shown below) on the basis of the identification of a glyoxalinic nucleus, methylimidazole, a lactic group, and an aliphatic C chain MeCH₂CCC.



radical joined to the glyoxaline; A was considered 1-methyl-5-pilopylimidazole, $\text{EtCH}-\text{CH}-\text{CH}_2-\text{C}-\text{NMe}$, or 1-methyl-4-pilopylimidazole; the position of



the *N*-Me group and the space relations about the 2 asym. C atoms were in doubt. A and B give parallel series of salts and other derivs. A is only slightly reacted on by warm HNO_3 , but dry A nitrate treated with excess of concd. H_2SO_4 gives readily nitropilocarpine (C); 10 g. A nitrate is added in small portions to 60-70 g. concd. H_2SO_4 at 0° with agitation. After 48 hrs. the mixt. is poured into 1 l. H_2O ; pptn. of C is completed by neutralization with NaOH and Na_2CO_3 , the soln. remaining slightly acid. The gelatinous ppt. is extd. with CHCl_3 , the ext. dried with K_2CO_3 , the solvent distd., and the residue taken up in boiling EtOH; on cooling, C seps. in colorless transparent very hard prismatic needles, m. $135-6^\circ$, in 80% yield. From the mother liquor is obtained by evapn. 15% of a yellowish mixt. of C and its isomer. C is insol. in EtO and PhH, slightly sol. in cold EtOH, very sol. in CHCl_3 , almost insol. in cold, slightly sol. in hot, H_2O ; on cooling a hot H_2O soln., a firm gel is formed. C is neutral to litmus, little sol. in cold dil. acids, more sol. in moderately concd. acids, forming salts which are at once dissociated on diln., pptg. a hydrogel. C is recovered unchanged when the HCl salt is evapd.; the introduction of the NO_2 group has destroyed the basic character of A. C is insol. in alkali carbonate solns., slowly sol. in cold, rapidly in hot, dil. alkalis giving, like delactonized A, colorless solns. of alk. reaction. The rotatory power of C in 5% CHCl_3 soln. is 104° ; in 1.25% EtOH, 66° , etc. As in nitroglyoxaline, the NO_2 group may be regarded as joined to the 5-atom of the imidazole radical. C is not changed by heating for 0.5 hr. at a temp. above its m. p., nor by heating several hrs. with dil. H_2SO_4 ; but alkalis delactonize and then isomerize it. An alk. soln. of C, made slightly acid with AcOH, deposits an abundant ppt. of white cryst. nitropilocarpic acid (D), little sol. in H_2O , insol. in EtO or CHCl_3 , sol. in 20% HCl, sol. in warm EtOH; it m. 199° , from EtOH. Pilocarpic acid has not been obtained in cryst. form. D dissolves in alkali carbonates, although neutral to litmus; the lactone form is restored either by evap. the H_2O soln. or by heating above its m. p. ($200-5^\circ$). The Na salt has $\alpha_D 35^\circ$ in H_2O , 54° in abs. EtOH. The Ba salt was prepd. by evap. to dryness the H_2O soln. after removing the excess of $\text{Ba}(\text{OH})_2$ with CO_2 ; white powder almost insol. in EtOH, $\alpha_D 23^\circ$. D has the structure

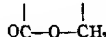


Nitroisopilocarpine (E) is prepd. as is C; it crystals from EtOH in small white prisms, and is more sol. in H_2O or EtOH than C; α in EtOH is -8° , in CHCl_3 -14° , in H_2SO_4 0° ; it is insol. in carbonates, but is delactonized in alkalis. E is obtained as well (see above) by isomerizing C with cold EtONa. E gives sol. alkali salts from which nitroisopilocarpic acid (F) is not pptd. by AcOH on account of its high soly. in H_2O ; when the acid soln. is concd., the lactone form is regenerated. The Na salt of F in abs. EtOH has $\alpha_D 47^\circ$; in H_2O , 50° . C is very readily reduced, as well in acid as in alk. agents; in analogy with other 4- or 5-nitroglyoxalines, C loses 1 mol. of NH_3 during reduction; it absorbs 3H_2 (C. A. 13, 1317); the main reduction product has not yet been isolated in cryst. form; the decompn. of the mol. is profound. A is very stable toward even boiling caustic alkalis or $\text{Ba}(\text{OH})_2$, but C, contg. the electronegative $-\text{NO}_2$, is much less stable; this property is common to all compds. contg. the glyoxaline nucleus (cf. Ber. 25, 274; 22, 1353); thus the Br derivs. of A or B with hot alkalis lose practically all NH_3 or MeNH_2 , forming homopilocarpic acid $\text{C}_8\text{H}_{12}\text{O}_4$ (G). The decompn. of NH_4 salts (cf. Pinner) is probably preceded by a migration of $-\text{OH}$ from N to a neighboring C atom, forming an imidazolinol, which would rapidly decomp. into MeNH_2 , RNH_2 , HCO_2H , pilopylactic acid. C treated with excess of hot $\text{Ba}(\text{OH})_2$ gives first the rapid

and complete evolution of 1 mol. of MeNH_3 , with a slight ppt. of BaCO_3 ; then a mol. of NH_3 is given up, but only after several hrs. distn.; the proportion of BaCO_3 varies with that of NH_3 , and is about 65% of the theoretical; the NH_3 is probably from a nitrogenous complex; there is also formed some N_2O , HCN , small amts. of a neutral substance, $\text{Ba}(\text{CN})_2$, $(\text{HCO}_2)_2\text{Ba}$, the Ba salts of pilopic acid (**H**), $\text{EtCH}-\text{CHCO}_2\text{H}$,



and of **G**, $\text{EtCH}-\text{CHCH}_2\text{CO}_2\text{H}$, and other undetd. products. The reaction is



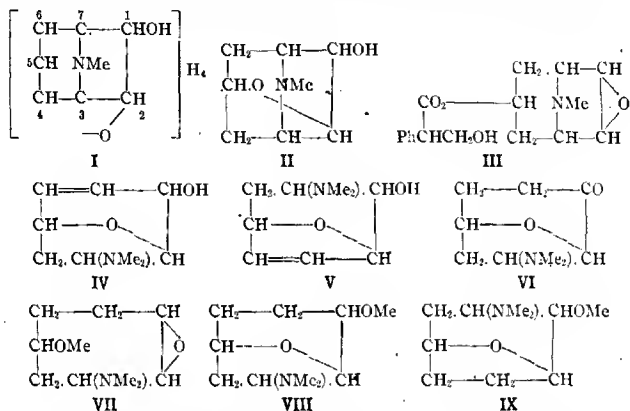
carried out in a flask with a condenser, with $\text{Ba}(\text{OH})_2$ of a concn. maintained at approx. 50%. After evolution of volatile products has ceased, the BaCO_3 is filtered off, and the excess Ba removed as BaSO_4 ; the soln. is extd. with CHCl_3 , the ext. after isolation again extd. with Et_2O ; the oily residue after evapn. is acid to litmus, has a hutyrac odor, and consists of **G** and **H** contaminated with N acids which are removed with a little dil. H_2SO_4 . **G** and **H** form either univalent lactonic, or bivalent hydrolyzed salts, the former with *e. g.*, BaCO_3 , the latter with hot $\text{Ba}(\text{OH})_2$. The Ba salts strongly retain H_2O of crystn., even at 120° . The mixt. of **G** and **H** is esterified with abs. EtOH and dry HCl in the usual way, washed in Et_2O soln. with Na_2CO_3 , and distd.; it b. $248-60^\circ$; some chlorination takes place at the same time. The mixed esters are amidified by 8 hr. contact in a cold, sealed tube with 15% alc. NH_3 , followed by heating on a H_2O bath; the crude amides are a thick oil which soon solidifies; crystn. from EtOH yields diamides of **G**, m. 206° , slightly sol. in H_2O and in cold EtOH , and of **H**, m. 168° , very sol. in H_2O . For a detailed discussion of the decompn. see original. In the degradation of **E**, the products are practically identical with those from **C**, except that in the former case the amide of **H** seems to preponderate over that of **G**. The study is being continued.

A. R. ALBRIGHT

Scopoline. VI. The constitution of scopolamine and of scopoline. The Hofmann degradation of scopoline. KURT HESS AND OTTMAR WAHL. *Ber.* 55B, 1979-2025(1922).—Hydrolysis of the natural *l*-rotatory scopolamine (**A**) with acids or alkalis yields inactive scopoline (**B**) and *l*-tropic acid (**C**). King (*C. A.* 14, 272) showed that **B** is a racemate and that the active components are not racemized under the conditions under which **A** is hydrolyzed, whence he concluded that the *dl*-form of **B** is present as such in **A**, whose optical activity is due to the optically asym. radical of the **C**, *i. e.*, that **A** is an example of a partial racemate. While it is easily possible that a *dl*-compd. may form a homogeneous salt with an active compd. without necessarily undergoing resolution, H. and W. consider the existence of a homogeneous ester of a *dl*-compd. with an active compd. to be excluded on theoretical grounds; in such cases there can be only a mixt. of 2 optically active, independent, chemically and physically different esters which, to be sure, may be isomorphous and therefore capable of forming mixed crystals but which it should be possible, on the basis of transition points, to sep. mechanically. H. and W., as the result of the present work, have overthrown K.'s views and established new constitutions for **A** and **B**. In attacking the problem, it was first attempted to esterify **B** with **C** (whose HO group was protected by acetylation) and compare the product with **A**, but when **B** is treated with $\text{AcOCH}_2\text{CHPhCOBr}$ the Ac radical changes place under the conditions necessary for esterification and acetylscopoline is formed. Likewise, attempts to esterify **B** with atropic acid (**D**) and compare the product with aposcopolamine (**E**) failed owing to the reactivity of the **D** which, at the temp. requisite for the esterification, easily passes over into what are probably polymerization products. With $\text{MeCHPhCO}_2\text{H}$ (**F**), however, it is possible to esterify *dl*-**B** quant., the product consisting of 2 enantiostereomeric racemates which are different from the single *dl*-desoxyscopolamine (**G**) which can easily be obtained from **E**. As the difference in the

3 esters cannot be ascribed to the acid component, which in all 3 cases is F, the basic alc. component in G (and therefore also in A) must be different from B. Since G yields but one racemate, there must be in G (and in A) only *one* asym. C atom, which can belong only to the C residue, and since it has been shown that B contains an asym. C atom the latter must be produced during the hydrolysis of the A; *i. e.*, the basic component of A must undergo a structural rearrangement during the hydrolysis. Reduction and oxidation degradations had shown that B has the structure I, only the 2nd point of union of the ether O atom being undetd. From expts. on the Hofmann degradation it had been concluded that this 2nd point of union was at C atom 7 (C. A. 14, 1985), but, as shown in the present paper, it is really at C atom 5, *i. e.*, B has the structure II. Since the work mentioned above shows that the basic component of A has a sym. structure, the O bridge must be between C atoms 1 and 2 and the esterifiable HO group at 5, A therefore having the structure III. This view was confirmed by the hydrolysis of G and of the 2 enantiostereomeric *desoxytropylscopolines* (H), all 3 of which yield the same products, *viz.*, B and F, the basic component of G undergoing rearrangement, during the hydrolysis, just as that of A does. This proof of the difference in structure of A and B clears up many facts which heretofore could not be explained, such as the non-resolvability of E and of natural *l*-A, the resolvability of benzoylscopoline, the identical rotations (in opposite directions) and m. ps. of *d*- and *l*-A. It had already been shown that the Hofmann degradation of B gives first derivs. in which the N bridge has been broken but that when it is attempted to remove the N group from these compds. in the usual way by exhaustive methylation the N is not eliminated and there occurs a surprising methylation, with formation of a MeO compd. As there can hardly be any question of a methylation of the HO group present in B it was concluded that the MeO compd. is formed through the O of the bridge. This last assumption has been confirmed in the course of further work on the Hofmann degradation but the hope that the reaction would yield decisive evidence as to the position of the O bridge has not been fulfilled; such evidence, however, has been obtained in another way, as described above. For some reason which has not been cleared up, in the earlier work the degradation did not proceed normally, the catalytic reduction of the product indicating that it contained 2 instead of 1 double bond (cf. also Gadamer and Hamner, C. A. 15, 3113); now, however, products which absorb only 1 mol. H have been obtained. If B has the structure II, it might be expected to yield, on the Hofmann degradation, the compds. IV and V which, since they contain 2 asym. C atoms, should each occur in at least 2 enantiostereomeric *dl*-forms. As a matter of fact there were obtained 3 *desmethylscopolines* (α , β and γ) (J), reduced catalytically to their *dihydro derivatives* (K), and a compd. with ketone properties, designated *desmethylscopolinone* (L), which is probably the ketonic form VI of the normal enolic degradation product of B. Homogeneous α -K subjected to repeated degradation by exhaustive methylation yields *O-methyliso- α -dihydrodesmethylscopoline* (M) which is assigned the structure VII because it is unchanged by further exhaustive methylation while the compds. VIII and IX, prep'd. by replacing the HO group in α - and β -K by Cl by mild treatment with SOCl₂ and subsequently treating with NaOMe (under the same conditions α -K is unchanged by NaOMe, so that in the formation of VIII and IX no secondary change of the base by the NaOMe, perhaps involving the bridge O atom, is likely to occur and it is fairly certain that the VIII and IX have the same structures as the original K), are smoothly degraded into NMe₃ and an unsatd. compound (N), C₁₆H₁₁O₂. Tl₂ F, b. 260-2°, was obtained in 8.3 g. yield from 10 g. D in AcOH shaken 6 hrs. with H and Pt sponge; 5 g. warmed 20 min. on the H₂O bath with 10 g. SOBr₂ gives 5.5 g. of the *desoxytropyl bromide*, yellowish oil of penetrating odor, b₁₅ 106-7° (the SOBr₂ obtained almost quant. from boiling SOCl₂ under a reflux satd. with dry HBr, b₁₅ 30-3°, b₂₅ 65-8°). When 0.5 g. of the bromide in 3 cc. xylene and 5.5 g. powdered B. HBr are heated 10 min. on the H₂O bath and the sirup which seps.

is taken up in alc., filtered from the 0.5 g. unchanged B. HBr and pptd. with petr. ether, there is obtained 7.5 g. of the *hydrobromides* of the 2 forms of H, which are sepd. by alter-

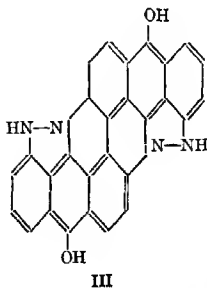
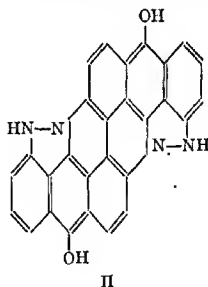
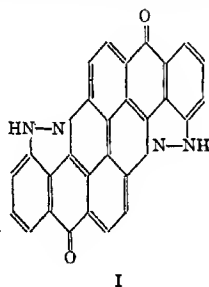


nate seeding of the slowly cooled alc. soln. with a crystal first of the one and then of the other form. The α -salt seps. from alc. in elongated needles, m. 205°, the β -salt from alc. in stout leaflets, mostly of quadratic form, from alc.-petr. ether in feathery forms, m. 170–7°. Free α -base (2.6 g. from 3.6 g. of the HBr salt in H₂O with NaHCO₃), thick rhombohedrons from Et₂O, m. 66–7°, very stable towards KMnO₄ in H₂SO₄; β -base, prisms from petr. ether, m. 63–4°. α -Picrate, quadratic leaflets from H₂O-Me₂CO (2:1), m. 172°; β -salt, cubes from H₂O, m. 130°. α -Methiodide, obtained quant. from the base in a slight excess of MeI, rodlets from alc., m. 195°; β -isomer, long fine needles from alc., m. 183°. α -Chloroplatinate, yellow warts from H₂O-Me₂CO, decomps. 155–7°; β -salt, m. 215° (decompn.). G, obtained in 2.1 g. yield from 2.7 g. E in AcOH with Pt sponge and H after 2 hrs., long fine needles from Et₂O, m. 69°, depresses the m. p. of the H to about 40°, immediately decolorizes KMnO₄ in H₂SO₄; *hydrobromide*, from the base in the calcd. amt. of cold 45% HBr immediately coned. *in vacuo* over Na, stout crystals, generally of quadratic form, from EtOH-Et₂O, m. 182–3°, depresses the m. p. of β -H.HBr to about 140°; *picrate*, thin lancet-like leaflets from Me₂CO-H₂O, m. 209–10°; *methiodide*, from the base in a little alc. with a slight excess of MeI, broad leaflets, m. 219° (decompn.); *chloroplatinate*, yellow warts from H₂O-Me₂CO, m. 220°. B.MeI is obtained in 52.9 g. yield from 27.9 g. B in 25 cc. alc. treated in a pressure bottle with 30 g. MeI; 61 g. in 200 cc. H₂O digested at 0° with the Ag₂O from 42 g. AgNO₃, filtered, coned. and distd. under 13 mm. gives 25.7 g. of a mixt., b₁₀ 124–32°, of the three forms of J and of L, together with some B, from which the α -J crystals. after a time and can thus be obtained in 28% yield but the other 3 isomers can be completely sepd. only after catalytic hydrogenation through the picrates (see below). α -J, identical with the product formerly designated as α -pseudodesmethylescopoline (at that time it was not obtained in homogeneous form; it was believed to have 2 double bonds and was assigned an open-chain structure), m. 68–9°; *picrate*, m. 152–3°; *methiodide*, m. 248°; *benzoate hydrochloride*, m. 214°. If the degradation has been carried out carefully the products never absorb more than 1 mol. H on catalytic hydrogenation; the oily mixt. remaining after the α -J has crystd. out always absorbs less (as much as 30% less) than 1 mol. H, owing to the presence of L and B. α -K, needles from petr. ether,

m. 53°. b_{11} 120-6°; picrate, m. 183°; methiodide, m. 209-10°; *benzoate hydrochloride*, m. 219°. **M**, obtained in 1.8 g. yield from 6.0 g. α -K.MeI with Ag_2O and subsequent distn. *in vacuo*, b_{11} 116-20°; *picrate*, rhombic crystals, m. 185°; *methiodide*, spears from alc., m. 240-1°. α -Dihydrodesmethyiscopoline chloride (3 g. from 3.5 g. α -K slowly treated in ice with 2.5 times the calcd. amt. of $SOCl_2$ and warmed 10 min. at 60-70°), b_{11} 115-8°, m. 45° (*picrate*, m. 228° (decompn.)); 5.3 g. of the chloride heated 7 hrs. at 210-20° with 3 g. of 20% NaOMe gives 4.7 g. of the *methyl ether* (VIII), b_{11} 110-5°, 4.7 g. of which in 2 cc. alc. with 4.0 g. MeI in a pressure flask yields 6.5 g. of the *methiodide*, m. 174-5°, converted by treatment with Ag_2O and subsequent distn. *in vacuo* into NMe_3 and **N**, mobile liquid of pleasant flowery odor, b_{11} 70-1°, immediately decolorizes $KMnO_4$. From 25 g. of the degradation product of B are obtained after catalytic hydrogenation the following *picrates*; m. 182°, 11.8 g. m. 153° (cube-like crystals from alc.), 4.4 g. m. 194° (spears from $EtOH-H_2O$), 11.8 g. m. 163° (rhombic plates from alc.) and 7.5 g. m. 234° (photomicrographs of the characteristic crystals of these *picrates* are given), which yield, resp., 7.0 g. α -K (including that which seps. before the hydrogenation), 5.1 g. β -K, 1.9 g. γ -K, 5.1 g. **L** and 3.2 g. **B**. β -K, b_{11} 128-31°, fine needles from petr. ether, m. 78°; *methiodide*, rectangular leaflets, m. 249°; *chloride*, (3.4 g. from 3.8 g. of the base under abs. Et_2O slowly treated with 5 parts $SOCl_2$), b_{11} 122-5°, m. 38-9°; 2.6 g. heated 7 hrs. at 210-20° with 4 g. of 20% NaOMe gives 1.8 g. of the *methyl ether* (IX), b_{11} 110-20°; *methiodide*, leaflets, m. 225.5°, 2.2 g. of which, subjected to the Hofmann degradation, yields NMe_3 and 0.6 g. **N**. γ -K, b_{11} 120-8°; *methiodide*, m. 171°. **L**, b_{11} 117-9°, pointed prisms from petr. ether, m. 42°; *methiodide*, needles, m. 233-4°. With $H_2NCONHNH_2.HCl$ in 50% alc. **L** gives after 4 weeks crystals m. 257°, having the compn. $C_{12}H_{12}N_4O$, of a semicarbazone of $HCHO$, which are possibly a polymeric form of the compd. m. 169° obtained under similar conditions from 1- α -N-methylpiperidyl-2-propanone (C. A. 11, 2800). **L** does not react under the usual conditions with aq. NH_4OH or alc. $N_2H_4.H_2O$, whence it is concluded that the C:O group is resistant towards the ketone reagents and that in acid solns. **L** exists in the enolic form, an assumption confirmed by the fact that 0.6 g. **L** with $BzCl$ in C_6H_6N gives 0.6 g. of a *benzoate hydrochloride*, prisms from 50% $EtOH + Et_2O$, at once hydrolyzed to **L** and $BzOH$ by cold dil. alkalies and yielding a *picrate*, m. 213-4°. Reduction of the **K** with fuming HI and red **P** at 145-60° gives a compound $C_{12}H_{11}N$, b_{11} 59°, n_{D20} 1.70-2°, stable towards $KMnO_4$ in H_2SO_4 ; *picrate*, needles, m. 157-8°. In the reduction of the α -K $NHMe_2$ and a hydrocarbon are also formed. C. A. R.

Constitution of pyrazoleanthrone yellow. F. MAYER AND R. HEIL. *Ber.* 55B, 2155-64 (1922).—In Ger. pat. 255,641 is described the prepn. of a yellow vat dye (A) by gentle KOH fusion of pyrazoleanthrone (B) to which was assigned the constitution of an indanthrene deriv. Subsequent patents describing the prepn. of a **K** salt and alkyl derivs. (301,554, 302,259, 302,260) made such a constitution seem improbable. The purification of A, which is insol. in all the usual solvents, is extraordinarily difficult but an almost ash-free product was finally obtained by hydrolysis of the di-Bz deriv. and was found to have the compn. $C_{23}H_{15}O_2N_4$ or $C_{24}H_{14}O_2N_4$; it yields a **K** salt, mono- and dibenzyl and substituted benzyl derivs. and a di-Bz deriv., is extraordinarily stable towards oxidizing agents, easily forms a blue vat, yields anthracene as the only identifiable product on distn. with Zn dust and contains no free NH_2 groups. 8-Chloropyrazoleanthrone loses its Cl on KOH fusion and gives A, and the 2- and 4-methylpyrazoleanthrones (C and D, resp.) also yield Me derivs. of A but the 1-chloro-5,8-dimethyl compound (E) forms no dye. Positions 2 and 4 are therefore not involved in the dye formation but position 8 is. Structures of a dianthraquinonyl or perylene type for A are excluded—the former by the color of the vat and the stability of the dye, the latter by the analytical results—and A is believed to be a flavanthrene compd. Leaving aside

formulas with 3-valent C or 5-valent N with a 5th, non-ionogenic N valence, the only possible formula remaining for a flavanthrene-like product is I ($C_{24}H_{12}O_2N_4$); the vats would then have the structures II or III. The pure A (ash, 0.003–0.004, C 76.21–76.45, H 3.46–3.50, N 12.92%) was obtained by heating 2 g. of the di-Bz deriv. (below) 5 hrs. in a sealed tube at 110° with 20 cc. concd. H_2SO_4 ; it is not attacked by $CrO_2 \cdot AcOH$ after 40 hrs. nor can it be oxidized in the alk. vat or with HNO_3 in the presence of $Na_2Cr_2O_7$. From 2.5 g. of the violet-black K salt (which is obtained in 12 g. yield from 11 g. A warmed 15 min. on the H_2O bath with 20 cc. of 1:1 KOH and 1–2 cc. alc.) heated 2 hrs. at 120° with 5 g. Ph_3CH_2Cl is obtained 2.6 g. *N*-monobenzylpyrazoleanthrone yellow, fine red needles from $PhNO_2$, sol. in H_2SO_4 with red-yellow color; *N*-*p*-chlorobenzyl derivative (yield, 86.5%), bright red needles from $PhNO_2$, forming a blue vat and a red-yellow H_2SO_4 soln., dyes cotton red; *N*-*o*-nitrobenzyl derivative (yield, 77%, obtained at 150°), fine yellow-red needles from $PhNO_2$, sol. in H_2SO_4 with yellow-red color, forms a blue vat, dyes cotton red (in the vat the NO_2 groups are reduced); *N,N'*-dibenzoyl derivative (12 g. from 10 g. A refluxed 4 hrs. with 50 g. $BzCl$), bright yellow rhombs from tetralin. C (5 g. from 9 g. $1,2-C_6H_4(CO)_2C_6H_4ClMe$ boiled 5 hrs. with 5 g. $N_2H_4 \cdot H_2O$ and 1–2 particles of I in 90 cc. C_6H_5N), yellow-red needles from $PhNO_2$, m. 298–300°, sol. in much alc. with yellow color and fluorescence; 7 g. treated with 70 g. KOH and 50 cc. alc. as in the prepn. of A gives 2,2'-dimethylpyrazoleanthrone yellow, red-brown powder dyeing cotton in yellow shades; *N,N'*-dibenzyl derivative (1.3 g. from 2 g. of the dye (as the K salt) benzylated 3 times at 130°), very fine dark red needles from $PhNO_2$,



forms a blue vat, dissolves in H_2SO_4 with red-violet color; *N,N'*-dibenzoyl derivative, from the dye boiled 1 hr. with 10 parts $BzCl$, yellow crystals from tetralin, sol. in H_2SO_4 with red color, forms a blue vat. 1-Hydrazino-4-methylantracene (18 g. from 20

g. of the 1-Cl deriv. boiled 30 min. with 4 g. $N_2H_4 \cdot H_2O$ in 50 cc. C_6H_5N , brown-red needles from xylene, m. 185-6°; 15 g. heated 15 min. at 130-50° with 60 g. $PhNH_2$ and 5 g. $PhNH_2 \cdot HCl$ gives 13 g. D, fine yellow needles from tetralin, m. 288-90°; this yields 90% 4,4'-dimethylpyrazoleanthrone yellow which forms a blue vat, dissolves in H_2SO_4 with red-yellow color, dyes cotton yellow and forms a dibenzoyl derivative, yellow prisms from tetralin. 6,2',5'-Dimethylbenzoyl-2-chlorobenzoic acid (34 g. from 30 g. *p*-xylene, 24 g. $3-ClC_6H_3(CO)_2O$ and 40 g. $AlCl_3$ heated 10 hrs. on the H_2O bath), prisms from $AcOH$, m. 215°, sol. in H_2SO_4 with red color; heated several hrs. in 9 parts of 10% oleum it gives 96% of 1-chloro-5,8-dimethylantraquinone, slender yellow needles from $AcOH$, m. 186°, which, heated 30 min. in C_6H_5N with 0.4 part $N_2H_4 \cdot H_2O$ and then treated with $PhNH_2$ and $PhNH_2 \cdot HCl$, yields 93.7% E, golden yellow leaflets from $PhNO_2$, m. 291-2°; this with alc. KOH forms a K salt but it was in no way possible to convert it into a dye. C. A. R.

The absorption spectra of phenylazophenol and its derivatives (SMITH, BOORD) 3. Action of light on mesonitroanthracene (BATTEGAY, *et al.*) 3. Commercial developments in the organic chemical industry, 1922 (KILLHEFFER) 13.

α -Hydroxyaryl- β -aminoethanes. O. HINSBERG. U. S. 1,432,291, Oct. 17. α -Hydroxyaryl- β -aminoethanes are prepd. by reaction of aminoacetals upon phenols in the presence of H_2SO_4 , HCl or glacial $HIOAc$. β -Amino- α -bis(4-hydroxyphenyl)-ethane, from aminoacetal (A) and $PhOH$, m. about 95°. Aminobis(4-hydroxy-2-methyl-3-isopropyl-*o*-phenyl)ethane, from A and thymol, colorless needles, m. 220°. β -Amino- α -hydroxy- α -(2-amino-4-hydroxyphenyl)ethane, from A and *m*-aminophenol, flakes. β -Amino- α -hydroxy- α -(*o*-dihydroxydiphenyl)ethane, from A and pyrocatechol, m. 190°. β -Amino- α -hydroxy- α -(trihydroxyphenyl)ethane, from A and pyrogallol, very unstable. β -Amino- α -hydroxy- α -(carboxytrihydroxyphenyl)ethane, from A and gallic acid, is not pptd. as free base when an excess of NH_3 is added to an aq. soln. of its hydrochloride. β -Methylamino- α -hydroxy- α -(*o*-dihydroxyphenyl)ethane and β -methylaminobis- α -(*o*-dihydroxyphenyl)ethane, from methylaminoacetal and pyrocatechol, can be sep'd. by fractional crystn. of the evapd. hydrochloride soln. The non-crystg. portion corresponds to *adrenaline*. Diisoamylamino- α -hydroxy- α -(trihydroxyphenyl)-ethane, from *N*-diisoamylaminoacetal and pyrogallol, forms a flaky ppt. when NH_3 is added to its hydrochloride soln. β -Amino- α -bis(2-hydroxynaphthyl)ethane, from aminoacetal and β -naphthol, m. about 124°. By reaction between 1,8- $HOC_{10}H_6SO_3Na$ and aminoacetal, followed by addition of HCl and washing with H_2O , a product is obtained m. above 250°.

Alkyl amides of aromatic sulfonic acids. W. BADER and D. A. NIGHTENGAL. U. S. 1,433,925, Oct. 31. Xylenesulfonyl chloride and $MeNH_2Cl$ are heated with Na_2CO_3 at 80-100° in the presence of not to exceed 5% moisture to form $Me_2C_6H_4SO_2NHMe$, which may be recovered from the reaction mixt. by extrn. with C_6H_6 and rectification. Analogous reactions are carried out with various alkylamine salts, sulfonyl chlorides and alkali carbonates in the presence of only a small amt. of H_2O . C_6H_6 or other diluents may be present with the reacting materials.

Acetylmetylaminophenyl acetate. H. T. CLARKE. U. S. 1,434,420, Nov. 7. $AcCl$ is added beneath the surface of a heated bath contg. $AcOC_6H_4NMe_2$ while maintaining the temp. of the bath at about 190° in order to form $AcOC_6H_4NMeAc$.

Amino alcohols, ketones and other derivatives of the quinoline series. K. MIESCHER. U. S. 1,434,306, Oct. 31. Ethyl 2-phenyl-4-quinolylacetate, yellowish prisms, m. 52-54°, is obtained from the reaction products of Et-2-phenylquinoline-4-carboxylate, $NaOEt$ and $EtOAc$ heated in toluene for 24 hrs. It forms a difficultly

sol. bright green Cu salt and intense yellow salts with HCl and H_2SO_4 . *2-Phenyl-4-quinolyl methyl ketone* (A), yellow crystals. m. 75° , easily sol. in C_6H_6 and hot alc., is formed by heating Et 2-phenyl-4-quinolylacetate with 8 times its amt. of 25% H_2SO_4 and treating the reaction mass with Na_2CO_3 and ether, or from a soln. of 2-phenyl-4-cyanoquinoline in C_6H_6 treated drop by drop, with cooling, with an Et_2O soln. of Me-MgI; *hydrobromide*, yellow, m. 240° . *2-Phenyl-4-quinolyl bromomethyl ketone hydrobromide* (B), prepd. by brominating A, in concd. HBr or in an org. solvent, m. about 225° (decompn.); the *free base*, bright yellowish crystals, m. 91° . *2-Phenyl-4-quinolyl-dimethylaminoethanone monohydrochloride*, yellow crystals, m. 208° (decompn.), from Me_2NH and B in C_6H_6 cooled with ice and treated with alc. HCl. The *hydrobromide*, similarly obtained, m. about 206° . *2-Phenyl-4-quinolyl-diethylaminoethanone monohydrobromide*, bright yellow felt-like needles from alc. and ether, m. about 164° (decompn.). *2-Phenylquinolyl-4-piperididoethanone monohydrochloride* m. 235° ; *monohydrobromide* m. about 241° (decompn.). Amino alcs. with a primary amino group can be prepd. by reducing the corresponding isonitrosoketone, while the *N*-substituted amino alcs. can be obtained by reduction of the corresponding amino ketones. *2-Phenyl-4-quinolylaminoethanol dihydrochloride*, slightly yellowish crystals, m. 145° . *2-Phenyl-4-quinolyl-dimethylaminoethanol dihydrochloride* m. about 175° (decompn.). *2-Phenyl-4-quinolyl-diethylaminoethanol dihydrochloride* m. about 185° . *2-Phenyl-4-quinolylpiperididoethanol dihydrochloride* m. about 199° ; *monohydrochloride* m. about 162° . The *free base*, pptd. with Na_2CO_3 from an aq. soln. of the salts, white flocks, m. about 54° .

β -Halogen-substituted anthraquinone compounds. F. W. ATACK. U. S. 1,434,980, Nov. 7. Concd. H_2SO_4 at a temp. of about 200° (or somewhat lower if the heating is sufficiently prolonged) is used for converting α -haloanthraquinone derivs. into corresponding β -derivs. Chlorination of the anthraquinone (with use of a Cl carrier such as I in some instances) may be effected at the same time as the heating with H_2SO_4 to convert the α -deriv. into the β -deriv. as formed. Generally, in the case of the Br substitution products, β -bromo derivs. can be produced from α -bromo derivs. even in the presence of other substituents such as sulfo groups and in the presence of amino groups if they are in a different nucleus from the Br.

Ergotamine acid tartrate. A. STOLL. U. S. 1,435,187, Nov. 14. Cryst. ergotaminic acid tartrate, easily sol. in H_2O and stable when protected from atm. O is prepd. by reaction between ergotamine and tartaric acid in alc. soln. Ergotamine sulfate, hydrochloride, salicylate and citrate are obtained by similar reactions.

***p*-Cymene.** G. STALMANN. U. S. 1,433,666, Oct. 31. Terpenes b. 160 – 175° (such as may be obtained by fractionating pine oils) are heated with acids or acid salts and then treated with Cl and the product is distd. with steam in the presence of $ZnCl_2$ to recover *p*-cymene.

Purifying pyrogallol. D. J. CUTRONA, R. B. McCANN and D. W. BISSELL. U. S. 1,434,593, Nov. 7. Pyrogallol which may contain impurities such as tarry substances is purified by extn. with a hot hydrocarbon solvent such as xylene or solvent naphtha and crystg. out the pyrogallol on cooling the soln. after sepg. it from the insol. residue of the original material.

11—BIOLOGICAL CHEMISTRY

PAUL R. HOWE

A—GENERAL

FRANK P. UNDERHILL

The classification of aromatic odors in subclasses. S. OHMA. *Arch. néerland. physiol.* 6, 567-91(1922).—Many attempts have been made to classify the odors. Some of the systems proposed are: (1) the chem. classification by G. Cohn, (2) the psychological classification by von Haller, Giesler, and Henning, (3) the phys. classification by Zwaardemaker and Hagewind, (4) the physiol. classification by Linné, improved by Zwaardemaker who added to the system of Linné the odors of ethers and the empyreumatic odors. O. investigates the aromatic odors which form the second class by the Linné-Zwaardemaker system and which is divided again into 5 subclasses. Previous investigations performed at the lab. of Zwaardemaker by Kombura have shown that a perfect fatigue in the presence of a standard odor of a chief class produces a smaller degree of insensitiveness towards the standard odor of another class than an odor of one of the subclasses belonging to the same chief class. O. succeeds in producing a perfect fatigue by one of the representatives of any one of the 5 subclasses which is larger than the fatigue in the presence of other odors. The expts. are performed by measuring the perceptible minimum of the odorant substance which is dissolved and then evapd. in a special glass cage. The odors of camphor, eucalyptol, BzH, eugenol, citral and safrole are examd. in that way. It can be concluded that the camphor, the eucalyptol, and the eugenol belong to the same class; besides there exists a subclass of citral and one of BzH. The results are verified by examg. other odorant substances of the same class. The center of the aromatic class is formed by the odors of camphor. R. B.

The nature of the forces which determine the stability of aqueous solutions of gelatin at the isoelectric point. JACQUES LOEB. *Arch. néerland. physiol.* 7, 510-7 (1922).—L. assumes that 2 kinds of forces det. the stability of sols. (or the soly.) in general: (1) forces of attraction between the mols. of the solvent and the mols. of the solute, and (2) forces of elec. repulsion between the mols. of the solute. The first kind of forces is known to be the cause of the soly. of crystalloidal substances. The second kind has often been assumed to act in colloidal sols. This would mean that crystalloidal soly. and colloidal soly. are due to causes (or factors) which are entirely different. L. proves by expts. that such a conception is not justified, but that the same kind of forces, most likely of the first kind described, is active in colloidal sols. as in crystalloidal ones. The second kind really plays no role; this can be proved as follows: A soln. of 1% gelatin in water at the isoelec. point (p_H 4.7) is somewhat opaque. On adding neutral salts, such as NaCl, Na_2SO_4 , KCl, $CaCl_2$, the soln. clears up. This addn., however, not in the least produces elec. charges on the gelatin particles, as has been proved formerly by L. in extensive expts. (cf. *C. A.* 15, 2455; 16, 1597, 1786). Also, the velocity with which powd. isoelec. gelatin dissolves at 35° is greater for salt sols. than for pure water. The opaque 1% soln. of isoelec. gelatin also clears up on adding acid or alkali or a salt such as $LaCl_3$ in very small concns. All these substances have a well known electromotive action, producing an elec. charge on the gelatin particles (cf. Loeb, *C. A.* 16, 1786, 3672). It seems possible that in this case at least the increase observed in transparency of a gelatin soln. might have something to do with the elec. charges of the particles produced. It can be proved, however, that this assumption is not correct; it is known that the addn. of such salts as $CaCl_2$, NaCl or Na_2SO_4 , at a low concn., destroys the elec. charges of the gelatin particles, and no pptn. occurs owing to this destruction. Even in this case, therefore, no effect on the clear dissolving of gelatin due to elec. charges can be traced. R. BRUYNER

The efficiency of man and the factors which influence it. E. P. CATHCART. *Chem. News* 125, 280-3, 291-4, 317-8, 343-6(1922).—Of physiological as well as economic interest.

Enzymes as colloids. W. M. BAYLISS. *Naturwissenschaften* 10, 983-8(1922).—
A general review and discussion.

Behavior of enzymes after drying and exposure to heat. II. Enzymes of the enteric mucosa. CAMILLO ARTOM. *Arch. farm. sper.* 34, 131-44(1923); cf. C. A. 16, 2519.—The product obtained by scraping the enteric mucosa of the dog, then drying at 18-22° and extg. with distd. H₂O, loses its sucrose-inverting power if kept at 60° for 0.5 hr., and its ereptic activity if kept at 80° for 0.5 hr. If the dry prepn. is exposed to high temp. (60°, 80°, 100°) and then extd. with H₂O, its ereptic and inverting activity is only partially lost. At 100° for 0.5 hr. the loss amounts to 40-60% of the original activity.

Smell. E. R. WATSON. *Biochem. J.* 16, 613-8(1922).—Aq. solns. of diff. strengths of the substance to be tested were taken, and the min. strength that could be detected by smelling was noted. "Almost contrary to expectation it was found that consistent results could be obtained in this way, and that several persons obtained practically the same results. Then it was discovered that those substances had the strongest smell which produced the greatest depression of the surface tension in aq. soln. (dtd. by rise of soln. in a capillary tube). Out of 22 substances examd., 17 could be arranged in exactly the same order, whether they were arranged according to increasing depression of surface tension or increasing intensity of odor. The list is: HCOOH, MeOH, AcOH, EtOH, propionic acid, MeOAc, MeNH₂, phenol, EtOAc, butyric acid, iso-amyl alc., quinoline, cinnamaldehyde, citral, allyl sulfide, geraniol. The exceptions were NH₃, pyridine and Et mercaptan. Adsorption by charcoal runs parallel with depression of surface tension; therefore substances with the strongest smell are mostly readily adsorbed from aq. soln.

Heat coagulation of proteins. W. W. LEPESCHKIN. *Biochem. J.* 16, 678-701 (1922).—The coeff. of denaturation is equal to 1.5-2.5 per degree (a similar reaction was found by L. for the chemical reaction between starch and water during the swelling of starch in hot water). It is probable that the denaturation is a slight hydrolysis of protein, but such hydrolysis cannot be discovered by chem. analysis. An increase of salt concn. accelerates the denaturation of albumin when the salt concn. is small, diminishes it when the salt concn. is great, and leaves it unaltered if the salt concn. is intermediate. The coagulation of denatured protein proceeds at a certain temp. considerably more rapidly than the denaturation at the same temp. if the protein soln. contains a sufficiently great amt. of salt. Acid strongly increases, and alkali strongly diminishes the coagulation rate of denatured albumin. Salts lower the degree of dispersion of albumin solns. Albumin is altered by a very prolonged dialysis in such a manner that, after denaturation, it shows a greater susceptibility to salts than before. The process of coagulation of denatured albumin is not simply a physical phenomenon of discharge of colloidal protein particles owing to an adsorption of electrolytes (ions), but is, at least partly, a chem. phenomenon, in which not only elec. properties but also chem. properties of salts are significant.

The adhesiveness of leucocytes to solid surfaces. W. O. FENN. *J. Gen. Physiol.* 5, 143-67(1922).—Expts. were made to prove whether the phagocytosis of solid particles by rat leucocytes is merely a special case of the tendency of these cells to spread upon solid objects. The results were: Quartz particles are more readily phagocytized in acid solns. than C particles, the reverse being true for alk. solns. But stickiness to coal is greater than to glass under both acid and alk. conditions. Serum increases the phagocytosis of solid particles, but decreases stickiness to glass, coal, mica and paraffin. The

optimum temp. for phagocytosis is 37° ; for stickiness it may be 20° . Hypotonic NaCl decreases phagocytosis, but increases stickiness in the presence of serum. CaCl_2 , EtOH and CHI_3 increase the phagocytosis of C in small concns., but are without effect or slightly decrease the stickiness to glass. Surface tension forces, though operative in detg. the behavior of cells in contact with solid bodies, are not the only factors involved. The suggestion is made that the effects of surface tension may be obscured by changes in the internal structure or consistency of the cell protoplasm. Ways are indicated in which the structure or rigidity of the protoplasm might affect phagocytosis and adhesiveness in opposite directions. **Effect of hydrogen-ion concentration on the phagocytosis and adhesiveness of leucocytes.** *Ibid* 169-79.—Leucocytes immediately after coming in contact with glass are most adhesive at p_H 8.0 or greater. Agglutination increases with increasing H-ion concn. from p_H 8.0 to 6.0. When leucocytes are creeping about on a slide picking up particles, the optimum p_H for phagocytosis is 7.0. This is due to the more rapid movement of the leucocytes at neutrality, and hence the greater availability of particles. The optimum p_H for the phagocytosis of quartz particles is 6.7. The phagocytosis of quartz increases with the acidity, but the adhesiveness of leucocytes to glass increases with the alkali. The results show that factors other than surface tension are involved in these reactions. CHAS. H. RICHARDSON

The equivalence of age in animals. S. BRODY AND A. C. RAGSDALE. *J. Gen. Physiol.* 5, 205-14(1922).—Of general interest to students of growth from the chem. standpoint. C. H. R.

The influence of ammonium salts on cell reaction. M. H. JACOBS. *J. Gen. Physiol.* 5, 181-8(1922).—Studies of cells of rhododendron flowers which contain a natural indicator, star-fish eggs stained with neutral red and of artificial cells made with living frog skin showed that increased intracellular alkali may be produced by solns. of NH_4 salts which give a decided acid reaction. This depends on the fact that NH_4 salts hydrolyze, that living cells are permeable to NH_4OH (or NH_3) but not to mineral acids and many org. acids, and probably that NH_4 salts are not permeable to the same extent as the base. Cf. *C. A.* 14, 2383; 15, 1321; 16, 2181. C. H. R.

The permeability of cells for oxygen and its significance for the theory of stimulation. E. N. HARVEY. *J. Gen. Physiol.* 5, 215-22(1922).—Living cells from various animal and plant tissues were as permeable to O as dead cells, as shown by the use of methylene blue as indicator. Sudden admission of O to the cell cannot account for increased oxidation as a result of stimulation. O penetrates the cell as rapidly as CO_2 and NH_3 (Cf. Jacobs, preceding abstr.). When living plant cells are exposed to high O pressures, certain oxidations which proceed readily in *dead* cells in the *air* are not initiated till after some hrs. More O enters the cell at high pressure, but the substances that initiate the oxidations (chromogen and oxidase) are kept apart by some phase boundary so long as the cell is alive. Eventually the increased O concn. causes injury to the cell. A method for rendering small amts. of fluid O-free by the use of strips of muscle tissue is described. CHAS. H. RICHARDSON

The permeability of living cells to dyes as affected by hydrogen-ion concentration. M. IRWIN. *J. Gen. Physiol.* 5, 223-4(1922).—Cells of *Nitella* were placed in brilliant cresyl blue and the concn. of the dye in the clear cell sap was detd. colorimetrically. Cresyl blue cannot penetrate the cell rapidly unless the outside p_H is much greater than the inside p_H . At p_H 9, penetration is rapid, but exosmosis of the dye is slow; at p_H 5.9, however, exosmosis is rapid while penetration is slow. CHAS. H. RICHARDSON

Some aspects of selective absorption. W. J. V. OSYERHOUT. *J. Gen. Physiol.* 5, 225-30(1922).—The cell sap of the marine alga, *Valonia*, from the Bermuda Islands contains the following compn. in parts per M: Cl 21.183, Na 2.072, K 20.143, Ca 0.69, Mg trace, SO_4 0.005. The sea water in which it lives contains Cl 19.605, Na 10.919, K

0.464, Ca 0.453, Mg 1.309, SO_4 3.327. A mechanism therefore exists which prevents Na, Mg, Ca, and SO_4 from reaching as high a concn. inside the cell as in the surrounding sea water. Some mechanism also causes the accumulation of K in the cells far in excess of that found in the sea water. Most of this cellular K exists as KCl. The concns. of Cl in the cell sap and in sea water are about equal. These facts do not harmonize with present theories regarding the accumulation of K in living cells. C. H. R.

Sodium chloride and selective diffusion in living organisms. JACQUES LOEB. *J. Gen. Physiol.* 5, 231-54 (1922).—NaCl acts like CaCl_2 or LaCl_3 in preventing the diffusion of strong acids (HCl) through the membrane of *Fundulus* eggs, the only difference being that $M/8$ NaCl soln. behaves like $M/1,000$ CaCl_2 and $M/30,000$ LaCl_3 solns. These salts, however, inhibit very slightly, if at all, the diffusion of a non-dissociated weak acid (AcOH) through the egg membrane. NaCl and CaCl_2 accelerate the diffusion of a dissociated strong alkali (NaOH), CaCl_2 being most efficient in this respect. Moderate concns. of NaCl accelerate the rate of diffusion of KCl through the egg membrane while CaCl_2 does not. Thus while salts inhibit the diffusion of acids through the *Fundulus* membrane, they accelerate the diffusion of acids through collodion membranes (cf. below). Cell membranes must, therefore, differ chemically and physically from collodion membranes. The influence of salts on the rate of diffusion of acid through collodion membranes. *Ibid.* 255-62.— $M/250$ solns. of CeCl_3 , CaCl_2 , NaCl, and Na_2SO_4 to which HCl was added to give a p_H of 3.0 were placed in collodion bags. The bags were then dipped into HCl soln. of the same p_H . After 1 hr. the p_H inside the bags had increased considerably, i. e., the H^+ concn. of the salt soln. had diminished. In the case of the chlorides, the expulsion of the acid through the membrane from the salt soln. to the salt-free soln. increased with the valency of the cation, and in this case with the concn. of Cl^- . After 3 hrs., the difference in acid concn. of the 2 sides of the membrane decreased and finally disappeared. With Na_2SO_4 this effect was not noticeable. It was previously thought these phenomena were due to the action of the membrane (C. A. 16, 726), but they are now explained as the influence of salts on the diffusion const. of acids (Arrhenius, Theories of Solutions, 1912, 163-5 (C. A. 6, 2710)). Reference is made to the difference between diffusion as noted here and in the case of living cell membranes (see above). "Since the effect of salts on the diffusion const. of acids must be the same in the case of membranes of living cells as in the case of collodion membranes, the retarding effect of salts on the diffusion of acids in the egg of *Fundulus* can only be ascribed to a modification of the membrane of *Fundulus* by the salts whereby a block is created to the diffusion of acids." CHAS. H. RICHARDSON

The mechanism of the influence of acids and alkalis on the digestion of proteins by pepsin or trypsin. J. H. NORTHROP. *J. Gen. Physiol.* 5, 263-74 (1922).—The effect of the addn. of acid on the amt. of ionized protein was compared with the effect on the rate of digestion of gelatin, casein, and hemoglobin by pepsin. Similarly, a comparison was made of the addn. of alkali on the rate of digestion of gelatin, casein, hemoglobin, globin and edestin by trypsin. The rate of digestion may be predicted in general from the amt. of ionized protein as detd. by titration or elec. cond. The min. rate is at the isoelec. point of the protein, the max. rate at the p_H at which the protein is completely combined with acid or alk. to form a salt. It is shown experimentally that swelling, osmotic pressure, "degree of hydration," etc., have no direct connection with the hydrolysis of proteins by pepsin or trypsin. Cf. C. A. 16, 1597. C. H. R.

B—METHODS AND APPARATUS

STANLEY R. BENEDICT

Some remarks with regard to the capillary analysis of stomach juice according to Holmgren. C. H. LASCH. *Münch. med. Wochschr.* 69, 705-6 (1922).—Holmgren

places a drop of stomach juice on filter paper impregnated with Congo red. From the radius of the blue and the wet ring the amt. of free HCl can be calcd., taking into consideration the absorption coeff. of the paper. The detn. was carried out in a number of instances with 1% Congo red and 0.5% alizarin red. The values were compared with the titration values obtained with dimethylaminoazobenzene, phenolphthalein, and Congo red. The Holmgren tests with Congo and alizarin red agreed well. Phenolphthalein titration gave higher values, as is to be expected. The titration with dimethylaminoazobenzene and with Congo red gave lower values. S. AMBERG

The determination of the real acidity and the total quantity of acid in the stomach. H. Vos. *Nederl. Tijdschr. Geneeskunde* 66, II, 2364-9(1922).—V. detn. the pH of the unfiltered content of the human stomach (1) by means of the H electrode, (2) by the reagent of Günzburg in the way described by Steensma (*C. A.* 2, 2573). The result of the investigation is that a difference exists between the elec. and the indicator method at $pH > 2.1$, e. g., in a very acid medium, the indicator method giving too small values. In a less acid medium both methods agree with each other. The total quantity of the acid in the stomach is detd. by titration with rosolic acid as indicator. R. BEUTNER

The tannic acid method for the quantitative determination of carbon monoxide in blood. R. R. SAYERS AND W. P. YANT. U. S. Pub. Health Service, *Pub. Health Repts.* 37, No. 40, 2433-9(1922).—See *C. A.* 16, 3323. E. J. C.

Methods for determination of calcium in the blood. Experimental control of the method of Jansen and of that of Marriott and Howland. GIOVANNI DE TONI. *Arch. farm. sper.* 34, 124-30, 145-9(1922).—Compared with the gravimetric method for Ca, the volumetric method of Jansen and that of Marriott and Howland both gave low results. The error was greater with blood serum than with pure $CaCl_2$ soln., and still greater when $CaCl_2$ was added to the serum. A. W. DOX

A simple and rapid technic for the determination of phenolsulfonephthalein in the urine. J. ESTÈVE. *Bull. soc. pharm. Bordeaux* 60, 172-5(1922).—Pour into a 100-cc. calibrated flask 0.1 of the total vol. of urine collected 1 hr. and 10 min. after the injection of the phenolsulfonephthalein (6 mg.), add 10 drops of NaOH soln. and dil. the whole with distd. H_2O to 100 cc. To 1 cc. of the phenolsulfonephthalein soln. in a test-tube add 9 cc. of distd. H_2O . Pour 1 cc. of this dil. soln. into a 100-cc. calibrated flask, add 10 drops of NaOH soln. and fill to the mark with urine voided before injection of the reagent. Fill a colorimetric tube with the standard soln. up to a height represented by H . In a second tube gradually introduce by means of a pipet the urine prepd. for examn. until the depth of color is the same as that of the liquid in the 1st tube. Read the height which can be represented by H' . The standard soln. contains 6 mg. of phenolsulfonephthalein per l.; the wt. of the reagent eliminated in the urine will, therefore, be $\delta H/H'$ and the percentage eliminated in 1 hr. in 10 min. will be $(wt. \times 100)/6$. A. G. DUMEZ

Disappearance of acetone from urine during fermentation; conservation of urine for examination. RENÉ GUYOT. *Bull. soc. pharm. Bordeaux* 60, 184-6(1922).—The legal test for acetone in urine becomes negative soon after ammoniacal fermentation sets in. The disappearance of the acetone is complete at the end of 5 days. Thymol, which is commonly used to preserve specimens for examn., does not inhibit ammoniacal fermentation, especially in the urine voided by patients suffering with *bilharziasis*. $HgCl_2$, $Hg(CN)_2$, or CH_2O is recommended as the most suitable agent for this purpose. A. G. DUMEZ

A new principle in the demonstration of the veronal group. HEINRICH HANDORF. *Z. ges. expl. Med.* 28, 56-80(1922).—By means of the murexide reaction veronal can be detd. in the urine. E. B. FINK

Analytical contributions. III. I. PINCUSSON. *Biochem. Z.* 132, 242-4(1922).—

Urea is detected by the action of urease, liberation of NH_3 by Na_2CO_3 and testing with litmus paper. In the detn. of *proteases*, after the substrate and enzyme have been allowed to digest, the residue is filtered, the protein pptd. by colloidal Fe, made to vol., filtered and total N detd. in aliquots of the filtrate. The addition of a buffer mixt. of desired pH allows the sepn. of *peptic* and *tryptic enzymes*. F. S. HAMMERT

Identification of inulin by a mycological method. ALDO CASTELLANI AND F. E. TAYLOR. *Biochem. J.* 16, 655-8(1922); cf. *C. A.* 13, 28; 14, 1347 and *Lancet* 1, 847 (1920).—A fungus, *Monilia macedoniensis* Castellani and allied species, causes a complete fermentation of inulin with large production of gas. An example of the method employed is as follows: A 1% soln. (in sugar-free peptone water) of the substance to be tested is distributed between two tubes, No. 1 and No. 2, each contg. a Durham's fermentation tube, or some similar arrangement. No. 1 is inoculated with *Monilia macedoniensis* Cast., No. 2 with *M. tropicalis* Cast. The two tubes are placed in an incubator at 35-37° for 72 hrs. If after that time, No. 1 tube contains gas and No. 2 tube does not, the substance is inulin. *M. macedoniensis* ferments (with production of gas) glucose, levulose, galactose, sucrose and inulin, whereas *M. tropicalis* Cast. ferments (with production of gas) glucose, levulose, maltose, galactose and sucrose, but not inulin. A table is appended contg. the fermentative characters of the various fungi and bacteria used in the method devised by the authors, and a list is given of the principal mycological formulas which the authors have devised and employed in the identification of maltose, galactose, sucrose, levulose, glucose, inositol, lactose and pentoses. BENJAMIN HARROW

Determinations of moisture content of expressed plant tissue fluids. R. A. GORTNER AND W. F. HOFFMAN. *Bot. Gaz.* 74, 308-13(1922).—The moisture content is detd. by making use of the refractive index of the plant sap, a method similar to that employed by sugar manufacturers in refractometer studies. BENJAMIN HARROW

The determination of ammoniacal nitrogen in organic matter. J. FROIDEVAUX. *Chimie et industrie* 8, 792-6(1922).—F. critically reviews the various methods used (distn., Sørensen, Ronchère, Schlösing, Folin, etc., pptn). He proposes using concd. alkali (35 cc. of 60% NaOH for 15 cc. of the soln. to be analyzed) at room temp. (16-24°) to liberate the NH_3 which is carried off by a current of air of 150-200 bubbles a min. and absorbed in standard acid. (Cf. Froidevaux and Vandenberghe, *C. A.* 15, 1055.) Foaming in the reaction flask can be stopped by adding a few cc. of NH_3 -free Et_2O . The ammoniacal and amino N is practically all liberated in 8 hrs., protein N is liberated very slowly; and amino acids are practically unaffected. The rate of liberation of N is shown by a curve from which, by titrations at the end of 7.5, 24 and 29 hrs., the amt. of ammoniacal N can be found. The method was tested by adding varying amts. of $(\text{NH}_4)_2\text{SO}_4$ to 0.5 g. of ovalbumin, peptone, tyrosine, tryptophan, phenylalanine, histidine-HCl, creatine, urea, and uric acid, resp., and detg. the ammoniacal N. The max. difference from theoretical results was -0.0005 g. of 0.0339 g., the av. error being about $\pm 0.05\%$. Cf. *C. A.* 16, 3324. A. P.-C.

C—BACTERIOLOGY

A. K. BILLS

The theory of disinfection. L. T. FAIRHALL. *Military Surgeon* 50, 3, 295-305 (1922).—A summary. L. T. F.

The disinfectant action of dye-metal combinations. HANS LANGER. *Z. ges. expul. Med.* 28, 45-9(1922).—The salts of metallic ions when added to dyes increase their action by changes in dispersion of the dyes. E. B. F.

The influence of tryptaflavine on diphtheria infection and intoxication. AD. REINHARDT. *Z. Hyg.* 95, 1-26(1922).—A diln. of 1:1000 and 1:10000 of tryptaflavine mixed

with 8 fatal doses of diphtheria bacilli and injected immediately into guinea pigs completely neutralizes the toxic action of the organisms. These same dilns. of trypaflavine injected $1/2$ - $3/4$ hrs. after the injection of a fatal dose of diphtheria and into the site of inoculation prevented the death of guinea pigs. A 1:100 diln. of trypaflavine prevents death from a fatal dose of diphtheria bacilli killed with toluene. Trypaflavine not only kills diphtheria bacilli but neutralizes the toxin that is secreted by the organisms or that which arises from dead bacteria. In this respect it differs from other bactericidal substances as phenol, $HgCl_2$, and tinct. I.

JULIAN H. LEWIS

Experimental wound infection and wound disinfection. AN. REINHARDT. *Z. Hyg.* 95, 27-68(1922).—The best disinfectant in chicken cholera infection is trypaflavine. $HgCl_2$, 1:1000 and 10% $AgNO_3$ approach it in their action and tinct. I. has some beneficial action. In pneumococcus wound infections, trypaflavine had the most certain reaction. Next to it in efficacy was vaccine while optochin had very little action. Trypaflavine only was studied in streptococcus infections and the results showed some favorable action. The application of suitable disinfectants to wounds is of benefit not only because of their bactericidal action but because the bacteria are inhibited from growth until the body recovers from the depression in immunity which occurs at the beginning of a virulent infection.

JULIAN H. LEWIS

Experimental wound disinfection. O. SCHIEMANN. *Z. Hyg.* 95, 60-76(1922); cf. C. A. 17, 122.— $HgCl_2$ solns. (1:500-1:1000) are more active than trypaflavine solns. (1:100-1:1000) in preventing death by action on the bacillus of Friedländer in a wound made in the skin of a mouse. This corresponds to the relative action of the 2 substances on this organism *in vitro*. Trypaflavine has a slightly better action on mouse typhoid bacilli at the site of inoculation than $HgCl_2$, although the action of either is not marked. $HgCl_2$ has a decidedly greater bactericidal action on mouse typhoid bacilli *in vitro* than has trypaflavine. Wounds in mice infected with staphylococci and streptococci gave slightly better results upon treatment with trypaflavine than with dahlia. The good results of treating infected wounds with trypaflavine is not dependent on its inflammatory action but on its bactericidal properties.

JULIAN H. LEWIS

E—NUTRITION

PHILIP B. HAWK

NORMAL

Vitamin review. W. S. LONG. *J. Am. Assoc. Cereal Chem.* 7, 156-67(1922).

E. J. C.

The history of the calorie in nutrition. MILDRED R. ZIEGLER. *Sci. Monthly* 15, 520-6(1922).

E. J. C.

Significance of vitamin A in the nutrition of fish. K. H. COWARD AND J. C. DRUMMOND. *Biochem. J.* 16, 631-6(1922).—Two trout eggs per day per rat cause rats that have been fed on a vitamin A deficient diet to recover. A method is described of rearing young trout in the lab. About half-way through the larval period the exptl. trout were tested for vitamin A, and it was found that although the contents of the yolk sac were about half absorbed, considerable amts. of this dietary factor still remained. At this stage one young fish per day was sufficient to cause a good resumption of growth in the test rats. After about 4 weeks the yolk sacs were practically absorbed in every case and another test was made. This showed that the vitamin A content of the fish had fallen greatly and that actual utilization of that originally present in the yolk had occurred. ("It is probable that this fact is one of the reasons why the stage is so critical a period in the development of young fish.") When fish in the post-larval period are given food rich in vitamin A, their growth and development are satisfactory; but where the diet is deficient in this vitamin, growth is subnormal, even though adequate amts.

of protein are given. These expts. confirm previous findings which show that the stores of vitamin A in the tissues of fish can be derived from food (cf. *C. A.* 15, 4021; 16, 3685).

BENJAMIN HARROW

Feeding experiments in connection with vitamins A and B. III. Milk and the growth-promoting vitamin. IV. The vitamin A content of refined cod-liver oil. A. D. STAMMERS. *Biochem. J.* 16, 659-67(1922); cf. Osborne and Mendel, *C. A.* 14, 702 and Hopkins, *C. A.* 15, 1556.—II. asserts that 2 cc. of milk added to the basal diet of rats gives rise to normal development. The rats used by S. were survivors from a previous expt. (which does not make the results strictly comparable to those obtained by Osborne and Mendel, and Hopkins) which lasted 101 days, and in which the diet was deficient in vitamin A. The av. wt. of the animals at the commencement of the earlier expt. was 57 g. and at the termination, 80 g.; the normal increase for this period is 142 g. Ten of the survivors, with an av. age of 150 days, were selected for the present expt. Eight of these showed signs of xerophthalmia. Throughout the test they received 2 cc. of cow milk per animal per day and the only other food was entirely deficient in vitamins, —basal dietary 85%, and steam-distd. palm-kernel oil (*C. A.* 15, 3887) 15%. The av. wt. of the 10 animals at the commencement of the expt. was 80 g., and at the end (in 111 days), 118 g. This increase of 38 g. compares favorably with the normal increase for this period and age (43 g.); the xerophthalmia disappeared, "and the animals improved out of all knowledge in general condition." Several varieties of cod-liver oil, when added to the diet of animals showing deficiency symptoms, did not cause normal growth. The explanation offered for these results is (a) that the growth impulses of the animals in these expts. had, owing to their ages (135 and 160 days), been deprived to a great extent of their power to react to the stimuli applied even by a fat rich in vitamin A, or (b) that the oil had in the process of refinement lost a large part of its original vitamin A.

BENJAMIN HARROW

The distribution of vitamin B in the wheat kernel. MARION BELL AND L. B. MENDEL. *Am. J. Physiol.* 62, 145-61(1922).—Vitamin B was detd. from the growth of mice fed "synthetic" diets in which the wheat product being tested was the sole source of vitamin B. Marquis spring wheat contained considerably more vitamin B than did Minnesota winter wheat, 15% of the former in the diet and 40% of the latter being about the min. sufficient to meet the requirement for growth. Vitamin B in the Minn. winter wheat was divided among the various milling products about as follows: patent flour 0 to 5%, first clear 10 to 15%, second clear 5%, low grade 16%, middlings 40%, bran 24%. The min. amt. of each product in the diet adequate for normal growth was about as follows: whole-wheat 40%, first clear 40% (?), second clear 40%, low-grade 20%, middlings 10%, bran 20%. Expts. with hand-dissected portions of wheat showed that vitamin B is present both in the embryo and endosperm. The concn. in the former is several times as great as that in the latter but the absolute amt. contained in the germ is not over 16% of the total amt. in the grain. Wheat grains were cut in half crosswise and equal amts. of the two ends fed to different animals. The rate of growth induced by both ends was practically the same.

J. F. LYMAN

Comparative food requirements of man and of domestic animals. A. M. LEROY. *Bull. soc. hyg. aliment.* 10, 415-33(1922).—The calcn. of the rations of domestic animals should be based on the use of isodynamic amts. of various fodders which can be used interchangeably provided there is no appreciable change in the total vol. of the ration or in the amt. of digestible proteins. The suggested unit is 1 kg. of oats or 2.5 kg. of hay of good quality. The ration can be divided into that required for upkeep (basal metabolism) and that required for production (meat, work, milk). The upkeep ration of animals of a given species is approx. proportional to their body surface, and consequently to their wt. The results obtained by this method of calcn. agree perfectly with those

calcd. from Kellner's "starch values" or Armshy's "therms," because all three systems are based on the nutritive equivalence of foods giving the same amt. of *net energy* to the organism, the units being equiv. to 1,650 large cal. (fodder unit), 2,360 (starch unit), and 1,000 (therm). L. applies this method to the calcn. of the ration of man (at rest and at work), of infants at the breast and during growth, and of nursing mothers. The method of calcn. of the ration of domestic animals during the period of lactation can be applied to the case of nursing mothers. A. P.-C.

Famine rations in Russia. SUZANNE DEJUST. *Bull. soc. hyg. aliment.* 10, 434-55 (1922).—A discussion of the pathological effects of the famine in Russia. A. P.-C.

Are the phenomena of avitaminosis in white rats modified by the administration of histamine? LOUIS BOYENVAL. *Arch. intern. pharmacodynamie* 26, 359-65 (1922).—On injecting histamine into rats fed upon polished rice B. found no modifying effect upon the cachectic progress of the disorder. On the other hand the histamine-treated rats did not show the usual premortal nervous disturbances observed in the control animals. B. thinks that histamine may exercise an antineuritic effect. W. A. P.

The antineuritic action of histamine in pigeons fed upon polished rice. W. KOSKOWSKI. *Arch. intern. pharmacodynamie* 26, 357-73 (1922).—K.'s findings are similar to those of Boyenval (cf. preceding abstr.) in that histamine did not influence the course of the cachexia of inanition nor prolong life in the histamine-treated pigeons, and in that it prevented the nervous disturbances preceding death. Although histamine stimulates the activity of the digestive glands, especially of the gastric glands, and thus aids in the complete digestion of the rice, it does not supply the lack of the nitrogenous substances found in the pericarp of rice grains, and it cannot therefore replace the antineuritic vitamin. Cf. C. A. 16, 1811. W. A. PERLZWEIG

F—PHYSIOLOGY

ANDREW HUNTER

The influence of the spleen on the red blood cells. N. A. BOLT AND P. A. HÆRRES. *Nederland. Tijdschr. Geneeskunde* 66, II, 259-66 (1922).—*The osmotic resistance of the red blood cells is decreased by the spleen; the cells are prepd. in the spleen for destruction which is known to take place partly in that organ. If red blood cells from the splenic vein are washed with equilibrated physiol. salt soln. they no longer exhibit this decrease of osmotic resistance, which shows that the hemolytic function of the spleen consists in a change of the surface of blood cells, most likely a decrease of the ratio cholesterol: lecithin. The resistance of the red blood cells against saponin is increased by the spleen. It is likely, therefore, that the cholesterol content in the surface of the blood cells is increased, too. In connection with the decreased osmotic resistance this would mean that the increase of the lecithin in the surface must be so great that the ratio cholesterol: lecithin decreases (cf. Brinkman, *Nederland. Tijdschr. Geneeskunde* 66, I, 2462 (1922)).* R. BEUTNER

The peptic power of the gastric juice. J. MALGOYRE. *Bull. soc. pharm. Bordeaux* 60, 175-9 (1922).—The usual methods, based on the amt. of albumin, fibrin, casein, etc., digested *in vitro*, do not give the true peptic power of the gastric juice. M. detrs. the "peptic coeff.," i. e., the ratio of peptones to aluminoids in the gastric juice after Ewald's test meal. Measure 20 cc. of filtered gastric juice into a beaker, add 20 cc. of AgNO_3 soln. (2.9%), cover with a glass funnel and heat on a water bath for $\frac{1}{4}$ hr. Cool, filter and titrate the excess of AgNO_3 in 20 cc. with KCNS soln. using Fe alum as indicator. If N cc. are required, then $10 - N = X$. X represents, expressed in NaCl per l., the total Cl plus the Ag aluminates formed. In a second operation treat 20 cc. of filtered gastric juice with 10 cc. of HNO_3 free from chlorides. Allow the ppt. to form and then add NaOH soln. drop by drop to a neutral or faintly acid reaction.

Dil. to 50 cc. and filter. Take 25 cc. of the filtrate and treat as in the first operation. If n is the number of cc. of KCNS consumed, $2(10-n) = x$. Here x represents, in NaCl per l., the total Cl plus peptones, the non-peptonized albuminoids having been pptd. The peptic coeff. is x/X . The relative values in normal gastric juice and in pathologic cases, are tabulated.

A. G. DUMZ

The influence of water introduction upon blood concentration induced by water deprivation. F. P. UNDERHILL AND ROBERT KAPINOW. *J. Biol. Chem.* 54, 459-64 (1922).—Female dogs were deprived of food and water until the blood concn., as measured by hemoglobin detns., no longer increased. This required 5-8 days. The hemoglobin concn. increased to from 25 to 40% above normal but was not maintained at a high level for a long time. The dogs, which were rather apathetic, were then given as much H_2O as they would take and the hemoglobin concn. of the blood was followed at frequent intervals. It quickly returned to the normal or to as much as 15% below normal.

I. GREENWALD

Note on the non-protein nitrogen of goat milk. WM. TAYLOR. *Biochem. J.* 16, 611-12(1922).—There is a definite correlation between the daily output of N in the urine and the % of non-protein N in the milk (obtained from the difference between the % of total protein N and the sum of the percentages of caseinogen, albumin and globulin N). "The mammary gland acts to some extent as an excretory organ, waste non-protein nitrogenous substances filtering through from the blood to the milk. The percentage in which these are found in milk seems to be detd. by the degree of concn. in the blood of the end products of protein metabolism."

B. H.

G—PATHOLOGY

H. GIDEON WELLS

Calcium and phosphorus in the serum in relation to rickets. J. HOWLAND AND B. KRAMER. *Am. J. Diseases Children* 22, 105-19(1921).—When the inorg. phosphates are to be detd. the blood serum should not be left in contact with the blood clot. The inorg. P content of the serum of 16 non-rachitic children 6 weeks to 5 yrs. of age varied from 4 to 7.1 mg. per 100 cc. with an av. of 5.4 mg. The av. for partly or wholly breast-fed infants, 5 in number, with 6 detns. (age 3-19 months) was 6.1 mg. with a range of 5.6-7.1. The Ca content of the serum of 14 cases of rachitic infants without signs of latent tetany varied from 8 to 10.8 mg. per 100 cc. The inorg. P of 23 cases ranged from 0.6 to 3.2 mg. (age 6 months-2½ years). In 4 of these cases the Mg was 1.8-2.5 mg. In a number of cases the influence of the administration of cod liver oil showed a decided increase in the amt. of inorg. P as for instance 2.9 to 6.6; 1.8 to 9.0; 1.6-6.8 mg. etc. In other cases this increase was not quite so pronounced.

S. A.

Metabolism studies in infants suffering from chronic nutritional disturbances (Athrepsia). K. UTREIM. *Am. J. Diseases Children* 22, 330-50(1921).—See C. A. 17, 131.

S. AMBERG

Observations on infantile tetany. B. KRAMER, F. F. TISDALL AND J. HOWLAND. *Am. J. Diseases Children* 22, 431-7(1921).—The inorg. P in infantile tetany is very variable. In about ½ of the cases its concn. is normal or slightly above normal. The ratio $(Na + K) : (Ca + Mg)$ is increased almost wholly because of a diminution of Ca.

S. AMBERG

Is there more than one kind of rickets? P. G. SHIPLEY, E. A. PARK, E. V. McCOLLUM AND NINA SIMMONDS. *Am. J. Diseases Children* 23, 91-106(1922).—There are two main kinds of rickets; one is characterized by a normal or nearly normal blood Ca and a low blood inorg. P; the other by a normal or nearly normal blood P (inorg.) but a low blood Ca.

S. AMBERG

A case of alkaptonuria in an infant. J. B. BILDERRACK. *Am. J. Diseases Children* 23, 258-9(1922).—Clinical report of a boy 15 months of age. S. AMBERG

The basal metabolism of prematurity. II. Relation of basal metabolism to caloric intake and weight curve. F. B. TALBOT, W. R. SISSON, MARGARET E. MORIARITY AND A. J. DALRYMPLE. *Am. J. Diseases Children* 24, 95-101(1922).—The results of observations on 7 premature infants are given. There was no gain in wt. until they were able to digest approx. 200 cal. per day, or as a rule decidedly more than 100 cal. per kg. of body wt. The basal metabolic requirement, measured in the respiratory chamber, fell considerably below 100 cal., varying on the whole from about 46 to 75. S. AMBERG

The inorganic phosphate content of breast milk of mothers with normal and with rachitic infants. L. VON MEYSENBUG. *Am. J. Diseases Children* 24, 200-3(1922).—Strippings were obtained from one breast and an equal amt. of fore milk from the other. The samples were mixed and analyzed. In a no. of instances the blood serum of the infants also was analyzed. The serum of non-rachitic infants (8) gave an av. of 5 mg. per 100 (variations 4.1-5.8 mg.). Sixteen samples of milk of mothers whose infants were not rachitic contained an av. of 4 mg. inorg. phosphate per 100 cc. (variations between 2.5 and 6.2 mg.). The serum of 2 rachitic infants averaged 2.8 mg. per 100 cc. (variations 2.2-4.1 mg.). The milk of mothers of rachitic infants (11) averaged 4.8 mg. per 100 cc. (variations 2.7-5.7 mg.), an av. falling within normal limits. S. AMBERG

Spasmophilia and the alkali reserve of the blood. J. K. CALVIN AND M. P. BOSOVSKI. *Am. J. Diseases Children* 24, 492-5(1922).—The CO_2 -combining power of plasma was detd. by the Van Slyke method in 3 cases. The values were between 40 and 55 cc. CO_2 per 100 cc. plasma, that is, there was no evidence of an "alkalosis" in spasmophilia. S. AMBERG

Lymph-gland enzymes as carriers of the Wassermann reaction. W. GENNERICH. *Münch. med. Wochschr.* 68, 603-4(1921).—Syphilitic lymph glands liberate lipid-splitting enzymes very readily. These enzymes are always present and may be increased under various pathol. conditions but particularly in cases of syphilis. S. A.

The layer test of serum with tuberculin according to Holländer. E. JABBE AND W. MASTINS. *Münch. med. Wochschr.* 68, 1285-6(1921).—Blood serum 0.5 cc. is stratified with 0.5 cc. old tuberculin and left in the incubator for 24 hrs., when a white ring forms in cases with positive reaction. This had been supposed to indicate a resistance of the organism against tuberculosis. The reaction was found to go parallel with that of Klausner, in which 0.6 cc. distd. water is added to 0.2 cc. serum, giving in positive cases a turbidity after standing 3-18 hrs. at room temp. The reaction (Holländer) can also be obtained with glycerol, glycerol broth, distd. water, NaCl and $(\text{NH}_4)_2\text{SO}_4$ solns. The reaction seems to be detd. by the physical state of the globulins and by the lipid content of the serum. S. AMBERG

The new simplified lues reaction (turbidity reaction) of Dold. A. POEHLMANN. *Münch. med. Wochschr.* 68, 1350-2(1921).—As turbidity reaction read after 4 hrs. the Dold reaction is not recommended, but when read after 24 hrs. with agglutinoscope as a flocking out reaction it agrees with the Sachs-Georgi reaction. S. AMBERG

Some determinations of lipochrome content in connection with a case of xanthosis in a baby of six weeks. E. BROUWER AND J. GORTER. *Nederl. Maandsohr. Geneeskunde* 2, 636-42(1921).—The lipochrome content of the serum varies *in vivo* between 0 and 0.6%; a high content (in one case 0.88%) is due to food rich in lipochrome which may be of the carotin group (carrots) or of the xanthophyll group (eggs). R. BEUTNER

Diagnosis of the diseases of hypersensitiveness (allergic diseases). W. STORM

VAN LEEUWEN, Z. BIEN AND H. VAREKAMP. *Nederland. Tijdschr. Geneeskunde* 66, 11, 2276-9(1922).—*Sufferers from allergic diseases (e. g., asthma, hay-fever, urticaria, etc.) react, with a local inflammation, upon a subcutaneous injection of an ext. of their own skin products.* Testing the skin reaction in the way prescribed by Schloss, Walker, Cooke, Coca and others, it was found that exts. of the skin of any animal will cause a local inflammation. Further expts. confirmed the assumption that there exists a sp. skin reaction against all kinds of skin exts. including man's own skin ext. Since a sp. reaction against a substance issuing from one special animal cannot be traced in most cases it is likely that the injection with an animal's epidermal ext. is not a sp. reaction for a product of that animal but for some kind of a skin product. Nor would it be true to state that an injection of any substance causes a reaction upon the skin of an allergic patient; histamine, peptone, casein, physiol. salt soln., etc., act upon hypersensitive patients in the same way as upon a normal man. For prep. man's epidermal ext. the following prescription is given: scurf of man, after being washed with ether, to remove the fat, is extd. with 0.5% NaCl contg. 2 g. NaHCO₃ per l. for 24 hrs. after adding toluene. The ext. is filtered through a Berkefeld-filter and first tested on a normal man as it may contain poisonous impurities.

R. BEUTNER

Inflammation and histophysics. R. THOMA. *Arch. pathol. Anat.* (Virchow's) 238, 366-91(1922).—A comprehensive theory of inflammation should include cellular and morphologic elements, chem. analyses, bacteriol. studies and clinical observations in addition to purely theoretical considerations such as histophysics.

H. B. F.

Diseases in which there is a labile degree of dispersion of the secretions. R. GEIGEL. *Arch. pathol. Anat.* (Virchow's) 238, 441-7(1922).—The changes in the bronchial secretion found in bronchial asthma such as the Curschmann spirals and Charcot-Leyden crystals are due to changes in the degree of dispersion of the colloids contained in these secretions. These changes alternate so that at times, by means of peptization there is an increased dispersion, at other times there is a lessened dispersion of the colloids.

E. B. FINK

A study in the diagnosis of cancer by means of serum reactions. J. A. SHAW-MACKENZIE. *Lancet* 1922, 11, 759-62.—Variation in the accelerating or activating power of serum on lipase, as contained in pancreatic exts. or in the juice itself, occurs in disease. This power of the serum is decreased in cancer but on improvement or recovery it returns to normal or is increased. These reactions are not sp. to cancer, as similar reactions occur in infectious diseases, tuberculosis and in certain non-cancerous conditions. The test consists in adding an Et₂O ext. of cancer tissue, with or without sapon., to cancer serum. This is followed by an appearance of turbidity after incubation which does not appear at all, or not to the same extent, with non-cancerous serum.

E. B. FINK

Hyperproteinemia following protein injections. WILHELM BERGER. *Z. ges. expl. Med.* 28, 1-44(1922).—The parenteral injection of protein leads to quant. and qual. changes in serum proteins. By micro-methods of detg. refraction and viscosity of the blood serum these changes can be measured without the complicating factors due to repeated loss of blood. The changes in concn. of the total blood proteins and the globulin and albumin fractions follow periodic phases consisting of a latent period, a stage during which the proteins are decreased followed by an increase. These changes may be correlated with the systemic reactions of the organism to the same influences such as leucocytosis, erythrocyte count, temp. and body wt. Hyperproteinemia is probably associated with an actual increase in the amt. of cell proteins in the blood and cannot be explained simply on the basis of a change in the H₂O balance between the blood and tissues. The regulation of the protein content of the blood depends upon the same factors as the regulation of the other blood constituents. The hypothesis

that globulin increase is due to humoral transformation of albumin into globulin is not tenable since globulin increase occurs as a primary condition independent of a decrease in albumin. Hyperproteinemia and hyperglobulinemia following protein injections did not run parallel with the appearance of precipitins in the blood. There is some evidence in favor of the idea that the changes in blood proteins observed in immunization are due to changes in the intracellular protein chemistry. E. B. FINK

Experimental epilepsy. ERICH SCHIFF. *Z. ges. expil. Med.* 28, 127-43(1922).—Epileptic convulsions may be produced in the dog by passing an alternating current through both eyes. The electrical energy required can be measured and varies among different animals but is const. for the individual. If animals are treated with daily doses of KBr preceding the expt. larger amts. of elec. energy are required to produce effects. Neither unilateral extirpation of the adrenal as advocated by Fischer nor the anti-epileptic serum of Hfeld had any influence upon this form of exptl. epilepsy.

E. B. FINK

The relation of the polarimetric activity of serum and the Wassermann reaction. P. RONDONI. *Z. Immunität.* 34, 416-24(1922).—Wassermann-positive sera in general have a higher polarimetric value than negative sera. The substance responsible for this property remains in the fraction pptd. by $1/2$ satn. with $(\text{NH}_4)_2\text{SO}_4$.

E. B. FINK

The tissue reaction and antitoxin production in horses following intrapulmonary injection of diphtheria toxin. RENJIRO KANEKO. *Z. Immunität.* 34, 424-43(1922).—The changes in the horse following repeated injections of toxin into the lungs consist largely of a chronic proliferative reaction plus more or less hemorrhage. The antitoxin contained in the lungs, liver, spleen, kidneys and adrenals of horses highly immunized by intrapulmonary injection is always less than that of the blood serum and depends upon the blood contained in these organs. Venous blood is richer in antitoxin than arterial blood. The spleen, supposedly the seat of antibody production, contains only a small quantity of antitoxin often less than the other organs. It cannot be said that the lungs are the chief seat of antitoxin production following intrapulmonary injection of toxin. It is much more likely that the production of antitoxin is a function of the organism as a whole.

E. B. FINK

The biology of male sex cells. ISEMATSU TSUKAHARA. *Z. Immunität.* 34, 444-54(1922).—The injection of testicular exts. into rabbits and guinea pigs is followed by well known symptoms of intoxication. The rabbit is more susceptible than the guinea pig. Male animals are more sensitive than female and pregnant animals are most susceptible. Pregnant animals when injected with sublethal doses always abort and the fetus is dead. The pathology in guinea pigs consists mainly in an emphysema of the lungs; this is practically never found in rabbits. Complement fixation and precipitin tests were negative while the Abderhalden reaction was positive. E. B. F.

Heterogenetic agglutinins. TROU-HIA-HSU. *Z. Immunität.* 34, 507-23(1922).—Heterogenetic antsheep blood sera usually do not contain a hemagglutinin for sheep blood. Sp. agglutinins for sheep corpuscles make their appearance in heterogenetic antiserum only after several days in old blood. The heterogenetic agglutinin is sp. for both serum and antigen, i. e., it will not react with another amboceptor such as beef amboceptor with old sheep blood nor will heterogenetic sheep blood react upon other types of blood cells such as old beef blood. Fresh blood corpuscles are not agglutinated when added to suspensions of old cells. Sheep corpuscles are not rendered sensitive to heterogenetic agglutinins by treatment with heat, EtOH, Et₂O or osmic acid. There are two types of agglutinins: one, the isogenetic agglutinin, is not bound by guinea-pig kidney cells; the other, heterogenetic agglutinin, is bound by such cells. The fresh and several day old sheep corpuscle possesses two binding groups one of which is an

chored by agglutinin of the isoserum, the other by heteroserum agglutinin. The isoreceptor is partially thermolabile; the heteroreceptor is thermostabile. Both iso- and heteroreceptors for agglutination are absent in beef blood corpuscles. E. B. F.

The structure of isogenetic and heterogenetic sheep blood hemolysins and their antigens. FRITZ v. GUTFELD. *Z. Immunol.* 34, 524-45(1922).—Isogenetic immune serum obtained by injecting rabbits with fresh sheep blood contains, in addition to isophile amboceptors, a certain quantity of heterophile amboceptors which can be sepd. by treating immune serum with organs of the heterogenetic type or by heated sheep blood. A pure isophile sheep blood immune serum (free from heterophile and sheep blood amboceptors) may be obtained by injecting fresh sheep blood into guinea pigs. Sheep blood satd. with isophile amboceptors is still able to bind heterophile amboceptors, while the reverse does not hold. In a mixt. contg. a preponderance of heterogenetic amboceptor, the isogenetic amboceptor can be detd. quant. after satn. of the heterogenetic fraction. The property of stimulating the production of isophilic receptors in guinea pigs and rabbits is a function of the protein fraction of fresh sheep corpuscles. The antigen for heterophile amboceptors in guinea pigs is a lipoprotein complex. The isophile amboceptors are bound by the protein fraction in fresh sheep blood, while the heterogenetic amboceptors are bound by the lipoprotein complex. E. B. F.

Electrocardiographic studies of anaphylactic shock in guinea pigs. H. KOENIGSFELD AND E. OPPENHEIMER. *Z. ges. expil. Med.* 28, 106-21(1922).—The cardiac disturbances observed in the guinea pig during anaphylaxis are not primary and sp. but are due to asphyxia. E. B. FINK

Respiratory exchange in cretinism and Mongolian idiocy. G. B. FLEMMING. *Quart. J. Med.* 16, 11-21(1922).—The basal metabolism was unduly low in the untreated cretin. Thyroid treatment raised the metabolism to about the normal level. The basal metabolism was normal in 6 Mongols. Thyroid treatment had no effect on the basal metabolism of a Mongol. Fever caused a rise in the metabolism of a Mongol. These results indicate that the basal metabolism rate referred to the body wt. gives a reliable index of nutrition. JOHN T. MYERS

Calcium and phosphorus metabolism. I. The excretion of calcium and phosphorus. S. V. TELFER. *Quart. J. Med.* 16, 45-62(1922).—The excretion of Ca, P, and their fatty derivs. is interdependent, Ca being eliminated chiefly as the phosphate and to a lesser extent as insol. soaps. A large part of the ingested Ca is not absorbed and appears in the feces as $\text{Ca}_3(\text{PO}_4)_2$. The total amt. of Ca and P eliminated is nearly proportional to the intake. There was no evidence that any appreciable amt. of endogenous Ca or P is eliminated. The urinary Ca is a small fraction of the total Ca excreted. In normal infants 40% of the total P excreted appeared in the urine and 60% in the feces. With acid formation in the intestine less is excreted by the feces and more by the urine. The degree of deviation of P to the urine was roughly proportional to the amt. of fatty acid in the feces, and, therefore, to the degree to which fatty acids had displaced phosphoric acid from its normal combination with Ca in the intestine. An excess of Ca restricts an increased amt. of P in the intestine. When the fat and P intake was low an excess of Ca rendered the urine free from P. The av. daily fecal wt. depends chiefly on the degree to which Ca soaps are formed. The Ca soaps form a mechanical basis for feces formation. When both the fat and P intake is very deficient, Ca may be excreted in the feces as CaCO_3 . No evidence of absorption of Ca and P in excess of requirements with re-excretion into the intestine was found. II. The metabolism of calcium and phosphorus in rickets. *Ibid* 62-72.—In normal infants on a diet of cow milk the retentions of CaO and P_2O_5 were approx. equal. An excess of P_2O_5 is retained over the equiv. amt. of CaO required for bone formation. In rickets there were diminished retentions of CaO and P_2O_5 . The diminished retention of P_2O_5 may

have been due not to a lessened absorption of P but to a diminished fixation by the Ca, the absorption of the latter being defective. No negative retentions of CaO or P_2O_5 were found, hence no support for the theory that bone softening in rickets is due to excessive decalcification.

JOHN T. MYERS

H—PHARMACOLOGY

ALFRED N. RICHARDS

Anesthetizing action of caffeine. B. ALEXANDER. *Deut. med. Wochschr.* 47, 272(1921).—Local application of caffeine solns. as well as caffeine taken *per os* seem to reduce quite definitely the sensitivity of the mucous membrane of the nose and of the conjunctiva as well as that of the cornea.

S. AMBERG

Pharmacological observations on healthy and diseased persons. Atropine and adrenaline as antidotes of morphine. A. BORNSTEIN. *Deut. med. Wochschr.* 47, 647(1921).—The administration subcutaneously of 0.5–3.0 mg. atropine sulfate has no marked effect on the respiration and does not increase the irritability of the respiratory center, which has suffered from morphine. Adrenaline in doses of 0.7–0.8 mg. produces an increased ventilation under such conditions.

S. AMBERG

The use of isopropyl alcohol for hygienic and cosmetic purposes. H. BORUTTAU. *Deut. med. Wochschr.* 47, 747–8(1921).— Me_2CHOH in expts. on rabbits showed about the same narcotic and toxic effects as EtOH. Small amts. can be given to animals *per os* or subcutaneously in proper dilns. for prolonged periods of time without harm.

S. AMBERG

Severe disturbances of hearing after the administration of chenopodium. H. EVERS. *Deut. med. Wochschr.* 47, 857–8(1921).—Oil of chenopodium given to patients may lead to severe and lasting disturbances of hearing.

S. AMBERG

Pharmacological observations on healthy and sick individuals. A. BORNSTEIN. *Deut. med. Wochschr.* 47, 1200–1(1921).—In some cases of diabetes mellitus the injection of atropine is followed by a reduction of the blood sugar.

S. AMBERG

The behavior of eucupine in the organism. E. BOECKER. *Deut. med. Wochschr.* 47, 1253(1921).—Eucupine administered to guinea pigs is found to a greater amt. in lungs than in the liver. Eucupine was found also in tuberculous lungs.

S. AMBERG

The influence of the hydrogen-ion concentration on the absorption and excretion of acid and basic organic dyes in the organism of warm-blooded animals. E. POBLE. *Deut. med. Wochschr.* 47, 1464–5(1921).—To be published in *extenso* elsewhere. Expts. on dogs which excrete only very small amts. of the acid eriocyanin or of cyanole when given *per os* in aq. solution. Nearly all goes into the feces. But if acid is given at same time *per os*, much more dye is excreted in the urine and the excretion begins sooner. The same is true for methylene blue, but here the excretion by the kidneys increases with the simultaneous administration of alkali. The more acid the urine, the more eriocyanin is excreted. After cessation of the excretion the urine becomes much more alk. as under normal conditions. If eriocyanin is given intravenously an administration of 100 cc. 0.1 N HCl *per os* favors its excretion through the kidney very much.

S. AMBERG

Silver neoarsphenamine and the chemotherapeutic activation of arsphenamine preparations by metals. W. KOLLE. *Deut. med. Wochschr.* 48, 17–9(1922); cf. C. A. 16, 3974.—On action of neoarsphenamine on Ag arsphenamine Ag neoarsphenamine is formed. CO_2 can be passed through its soln. several hrs. without causing a ppt., in contradistinction to Ag arsphenamine. On standing it hardly increases in toxicity while neoarsphenamine becomes 5–6 times more toxic on standing 24 hrs. with access of air. Ag neoarsphenamine is a brownish black powder; it remains unchanged in evacuated tubes. As long as not decomposed it dissolves very easily to a perfectly

clear light brown soln. with weakly alk. reaction. The content of As is about 20% of Ag about 6%. With access of air and moisture the powder undergoes a decompn. after some time with increase in toxicity; it changes color and the soln. is not clear. Good specimens show an empty field of vision under the microscope. It is recommended to prep. the soln. fresh. The toxicity is approx. $\frac{1}{2}$ of that of Ag arsphenamine and is but little more than that of neoarsphenamine. It is more active than the latter against trypanosomes. It has been used more than 18 months in the clinic in doses of 0.4 and 0.45 g. The angineurotic symptom complex is avoided. S. AMBERG

Methods to increase the action of arsphenamine on the diseased nervous system. F. KALBERLAH. *Münch. med. Wochschr.* 69, 114-6(1922).—Rabbits received neoarsphenamine intravenously alone or with methylene blue, Bismarck brown, or chrysoidine. After varying periods of time the animals were killed and the brains were analyzed for As. Brains of animals having received the combined injections contained more As and kept the As longer. S. AMBERG

The problem of iodism. O. MUCK. *Münch. med. Wochschr.* 69, 203(1922).—Drinkers and smokers are more subject to iodism than others. This is brought in relation to the increased amt. of KCNS in the saliva, nasal and conjunctival secretion of such people. S. AMBERG

Why is the out-flowing blood in too deep a narcosis dark colored? F. ROST AND ELLINGER. *Münch. med. Wochschr.* 69, 772-3(1921).—Cats were deeply anesthetized with ether and after some time the arterial blood contained less O_2 than before. The difference in the venous blood was much less marked and the CO_2 content did not show much difference. The animals were under artificial respiration and the blood pressure had not fallen. The dark color of the blood was due to methemoglobin formation detected by the absorption band at about 630μ . In $CHCl_3$ narcosis the same findings were obtained. Simultaneous O_2 administration does not prevent the methemoglobin formation. In the cases which showed the methemoglobin and survived this had disappeared after 24 hrs. S. AMBERG

The glycogen content of the tissues of diabetic animals and the influence of adrenaline thereon. A. I. RINGER, H. DUBIN AND F. H. FRANKEL. *Proc. Soc. Exptl. Biol. Med.* 19, 92-7(1921).—Fasting dogs were given daily injections of phlorhizin (1 g. in olive oil) by the Coolen method. From the 2nd to the 7th day of glucosuria, the glycogen content of the muscles was found to average for the succeeding tests 482, 306, 228, 155 and 138 mg. per 100 g. of muscle. Despite continuous fasting and complete diabetes, the muscle cells retained a certain amt. of residual glycogen. A 2nd series of dogs, similarly phlorhizinized, were injected with 3-7 mg. of adrenaline on the 2nd or 3rd day of glucosuria, and killed 24 hrs. later. No glycogen was found in the muscles. A third group rendered glycogen-free as in the 2nd series were given glycogenetic substances as glycine and alanine, propionic and lactic acids. In no instance was the resulting glucosuria at all comparable to that found in dogs not treated with adrenaline. In this series, sugar formation is interfered with, or these substances are utilized by the deglycogenized cells. A 4th group of dogs, deglycogenized as in group 2, were killed 3 days after the adrenaline injection. The following amts. of glycogen were found: 20, 33, 23, and 39 mg. per 100 g. of muscle. In one dog killed 5 days after receiving adrenaline this amt. was 69 mg. Fasting diabetic dogs possess the power of glycogen formation after that substance has been eliminated from the muscles by the administration of adrenaline. Failure of glucosuria is not a criterion of the glycogenetic quality of a substance, when given to deglycogenized diabetic animals. C. V. B.

Localization of titanium in the organisms. SCHOORS. *Bull. acad. roy. med. Belg.*, [5] 2, 473-6(1922).—Ti oxide, now used in paints, is not poisonous. After being fed to guinea pigs in a considerable amt. traces remain in the intestinal tract. It is never found in other organs. *R. BEUTNER

The poisonous properties and the dosage of emetine hydrochloride. A. LICHTENSTEIN. *Geneeskundig Tijdschr. Nederland. Indie* 62, 490-502(1922).—Emetine has cumulative poisonous properties with a strong paralyzing action upon the heart function, the respiration, the esophagus and the intestinal tract. In dysentery not more than 300 mg. should be given.

R. BEUTNER

Intoxications by combined mercury-arsphenamine treatment. F. E. HAZEBROEK. *Geneeskundig Tijdschr. Nederland. Indie* 62, 614-28(1922).—H. describes intoxications due to Hg and arsphenamine treatment of the kind observed in the tropic climate of the Dutch Indies: stomatitis, nephritis, diarrhea and icterus.

R. B.

Treatment of psoriasis by manganese. J. MOORE. *Brit. Med. J.* 1922, II, 41.—Neither salvarsan, its congeners, nor Hg have any beneficial effect, but colloidal Mn (intramuscular injections) clears up the disease in from 6 to 16 days; this suggests a sp. staphylococcus.

A. T. CAMERON

Acute arsenical poisoning. W. H. WILLCOX. *Brit. Med. J.* 1922, II, 118-24.—A review, dealing with prepns. used, symptoms, effect of repeated doses, fatal dose and period, post mortem examn., As elimination, and distribution in the body in fatal cases.

A. T. CAMERON

Action of alcohol in the human economy. E. MELLANBY. *Brit. Med. J.* 1922, II, 195-9. Alcohol in its relation to the problems of mental disorders. F. W. MOTT. *Brit. Med. J.* 1922, II, 199-203. General etiological factors in the alcoholic psychoses. J. T. MACCURDY. *Brit. Med. J.* 1922, II, 204-7. Alcohol and industrial efficiency. E. L. COLLIS. *Brit. Med. J.* 1922, II, 244-8. Alcohol restriction and mortality. M. HINDHEDE. *Brit. Med. J.* 1922, II, 248-52. Alcohol as a beverage and its relation to infantile mortality. J. W. BALLANTYNE. *Brit. Med. J.* 1922, II, 252-5. Alcohol as a selective agent in the improvement of racial stock. C. R. STOCKARD. *Brit. Med. J.* 1922, II, 255-60.

A. T. CAMERON

Influence of the electric current on the absorption of drugs. O. INCHLEY. *Proc. Roy. Soc. Med.* 14, Sect. Therapeutics and Pharmacol., 17(1921).—The elec. current causes absorption through the skin (rabbits, cats, guinea pigs) of atropine, aconitine, CN^- , strychnine, Fe^{++} , Ca^{++} , the salicylate and $Fe(CN)_6$ ions. With the last, 2 absorption through the knee-joint does not give greater penetration than does simple subcutaneous injection under the skin covering the joint.

A. T. CAMERON

Influence of the electric current on the absorption of drugs. O. INCHLEY. *J. Pharmacol.* 18, 241-56(1921).—Both positive and negative ions can be made to be absorbed through the skin or mucous membrane by means of the elec. current if solns. of the drugs are applied at the appropriate electrode. The current is conveyed through the body by the tissue ions; after the introduction into the body of the foreign ion the current has no further appreciable influence upon it. With a current localized in the tongue the atropine ion rapidly reaches the heart. The ferricyanide ion penetrates through the skin but after this the elec. current has no further influence. Cf. preceding abstr.

C. J. WEST

Oral administration of pituitary extract. P. HAMILL. *Proc. Roy. Soc. Med.* 14, Sect. Therapeutics and Pharmacol., 17-9(1921).—Expts. on cats prove that pituitary ext. administered by mouth causes the characteristic uterine contractions. Absorption takes place from the stomach and is more rapid when the stomach is full and rapidly digesting. Large doses produce colicky contractions of the intestine and vomiting. Clinical evidence is in agreement with animal expt.

A. T. CAMERON

Treatment of ten cases of Kala-azar by sodium acetyl-p-aminophenyl stibiate ("Stibenyli"). L. E. NAPIER. *Proc. Roy. Soc. Med.* 15, Sect. Tropical Diseases and Parasitology, 44-5(1922).—An adverse report.

A. T. CAMERON

The action on the organism of saccharin when used as a sweetener for foods. ED. BONJOUR. *Bull. soc. chim. biol.* 4, 322-8(1922).—See C. A. 16, 2554. A. T. C.

Studies on the chemotherapy of silver and arsenic compounds in experimental tuberculosis. M. I. SMITH. *Am. Rev. Tuberculosis* 6, 183-91(1922).—Neoparsphenamine and Ag arsphenamine have a very slight inhibiting action on the growth of the tubercle bacillus *in vitro*. Colloidal AgO has no effect on its growth, while Ag methylene blue has a very considerable inhibiting action on growth. None of these substances has any demonstrable effect on the pathogenicity of the tubercle bacillus when exposed to its action *in vitro* at 37° for 48 hours. No effect was noted on experimentally infected tuberculous guinea pigs.

H. J. CORPER

Guaiacol iodoform—A new therapeutic agent in tuberculosis. WILHELM MÜLLER. *Z. Tuberk.* 36, 26-35(1922).—Guaiacol iodoform on account of its tuberculocidal properties and the ease of its administration is the drug of choice in pulmonary tuberculosis. Microorganisms, like anthrax bacilli that possess no reducing power, are not affected by iodoform, while reducing bacteria, like cholera and tubercle bacilli, are greatly affected by it. Tubercle bacilli cultures that have been treated with iodoform produce a slow and chronic tuberculous infection in rabbits, while exposure to the drug for 3 weeks kills the bacilli. Added to glycerol bouillon 5% iodoform inhibits the development of the culture, while exposure to the same culture medium for 48 hrs. will destroy the bacilli. Iodoform acts best therapeutically where necrosis is present, *i. e.*, where the reducing property of the medium is at its highest. Not only does the drug kill tubercle bacilli but it acts as energetically on the reducing microorganisms of secondary infection. At times other organisms will disappear from sputum before the tubercle bacilli. When subcutaneous injections of guaiacol iodoform are given to tuberculous guinea pigs, the tuberculous process becomes either more chronic, arrested or entirely disappears. Caection of inguinal and retroperitoneal lymph glands was absent and there was no involvement of the spleen, liver and lungs. When the injections were stopped the tuberculous involvement of the above organs developed as usual. A series of 572 patients was treated. At first rectal suppositories of the guaiacol iodoform contg. from 0.5 to 2 g. of the drug were used. The result on the tuberculous process was beneficial but the drug proved too irritating for the rectum and intravenous administration was resorted to. Three solns. were used: (1) equal parts of olive oil and the guaiacol iodoform; (2) 5 of the drug to 1 of olive oil; and (3) the pure drug. The treatment begins with intravenous injection of soln. 1 twice weekly for 4 weeks in amts. from 0.5 up to 1 cc. This is followed by soln. 2 for 4 weeks in the same amts., after which the pure drug is given for a period of 2-3 months once or twice weekly in 1 cc. doses. After 10-15 injections fever disappears, then the tubercle bacilli in the sputum become less numerous and disappear, and with them the secondary pyogenic microorganisms. Sweats disappear and diarrhea is gradually improved. Phys. findings unmistakably showed the arrest of the disease. The treatment in most cases consists of only 40 injections although in advanced cases 60-80 injections are necessary to obtain arrest. In these cases untoward symptoms after injection such as chills and sudden drop of temp. below normal were met with occasionally. Toxic action on other organs of the body was never noticed, though animal experimentation on this point is lacking. M. insists that the treatment be carried out according to his directions.

H. J. C.

Arsenic poisoning and the distribution of arsenic in the human body. H. SCHELL-NACH. *Z. Nahr. Genussm.* 43, 351(1922).—A case of death from As poisoning was investigated. Shortly after the noon meal the man was attacked by cramps, followed by vomiting and diarrhea. Death occurred in about 1 hr. The total As_2O_3 content of certain organs was: lungs, 6.1 mg.; kidneys, 10.5 mg.; liver, 51.6 mg.; brain, 3.1 mg. It was believed that about 1 g. had been administered.

D. B. DILL

Barium in parts of a corpse. K. BAUMANN. *Z. Nahr. Genussm.* 43, 383(1922); cf. Kraft, C. A. 16, 1987.—Four persons partook of a pudding contg. $NaCO_3$. Three

of them suffered from vomiting and diarrhea but recovered. The 4th suffered from diarrhea and died in about 6 hrs. It was estd. that he had taken nearly 5 g. of BaCO_3 . The following quantities of BaSO_4 were recovered: stomach, liver and kidneys, 40.0 mg.; urine, 29.0 mg.; intestines, 65.0 mg.; heart, lungs and spleen, 11.5 mg.; total, 145.5 mg.

D. B. DILL

Pharmacological researches on a new iodized fat: iodized chaulmoogra. ADRIANO VALENTI. *Arch. farm. sper.* 34, 108-12, 118-23(1922).—Iodized chaulmoogra oil is of butter consistency, n. 29°, and contains 8% I. When administered orally the I accumulates in the liver and nervous tissue, and is eliminated more slowly than that of other iodized fats. Expts. with rabbits showed that elimination of I in the urine reached a max. during the first 6-8 hrs., but at least 4 days were required for elimination of 50% of the total I, and traces were still found after 11 days. No phenomena of intolerance were observed. Therapeutic uses are suggested.

A. W. DOX

The diuretic action of glycerol as compared to that of ethyl alcohol. CLAUDIO CUGUSI. *Arch. farm. sper.* 34, 150-73(1922).—Intravenous injection of glycerol in small doses stimulates the activity of the kidney. In larger doses it is a powerful diuretic, and in still larger doses it inhibits the renal function. EtOH acts similarly, except that, being more toxic, the same effects are obtained with smaller doses. Both EtOH and glycerol, while stimulating the renal activity and hence the elimination of NaCl, develop a certain tolerance to the drug.

A. W. DOX

Does a reciprocal antagonism exist between cocaine and strychnine? VITTORIO PISANO. *Arch. farm. sper.* 34, 174-91(1922).—No antagonism exists between cocaine and strychnine. Neither lethal nor non-lethal doses of cocaine act as antidotes for a lethal dose of strychnine, and *vice versa*. Previous injection of strychnine increases the toxicity of cocaine.

A. W. DOX

Bismuth compounds in syphilis. LUIGI TIRELLI. *Boll. chim. farm.* 61, 673-9(1922).—Clinical reports thus far available in Italy confirm the findings of the French investigators regarding the superiority of the combined treatment of syphilis with Na arsenobismuthate and colloidal Bi over the former treatment with tartrobismuthate or citrobismuthate.

A. W. DOX

Blood picture and blood crises in experimental lead poisoning. HANS RAUCHE. *Z. ges. expil. Med.* 28, 50-5(1922).—The basophilic granulation of the red cells in Pb poisoning is a form of degenerative regeneration referable to the oligodynamic action of Pb.

E. B. FINK

A study of the histologic changes produced experimentally in rabbits by arsphenamine, nearsphenamine and by mercurial compounds. J. A. KOLMER AND B. LUCKE. *Arch. Dermat. Syphilol.* 3, 483-570(1921); *Abstracts Bact.* 5, 433. H. G.

Changes of respiratory volume and elimination of carbon dioxide by anesthetics and hypnotics. C. HEYMANS. *Arch. intern. pharmacodynamie* 1921, 493-527; *Physiol. Abstracts* 6, 371-2.—A detn. of changes in the vol. of respired air and in the vol. of CO_2 expired in rabbits during and after anesthesia. Ether and CHCl_3 were administered intravenously. In surgical anesthesia both the respiratory vol. and the vol. of expired CO_2 are diminished 20-25%. Deep anesthesia causes a diminution of both as great as 50%. Up to this limit the percentage of CO_2 in expired air does not rise. H. concludes that a diminution of 50%, being greater than that after curarization, indicates a paralyzing effect of the anesthetic on the CO_2 production in peripheral organs.

H. G.

Chemical and physiological studies of muscarine and some of its derivatives. V. BRABANT. *Arch. intern. pharm.* 25, 295-320(1920); *Physiol. Abstracts* 6, 333.—Homomuscarine is $\frac{1}{4}$ as poisonous as anhydromuscarine. Triethylhomomuscarine is, however, equally poisonous with homomuscarine. The diastolic arrest produced by

the triethyl or trimethyl deriv. is not abolished by atropine. Details of the methods of prepn. of these substances are given. H. G.

Action of barium chloride on heart of tortoise in situ and its mode of arrest. J. F. FÉVRE DE ARRIC. *Arch. intern. pharm.* 25, 283-93. H. G.

Amyl nitrite and vascular reactions. G. RICHARD. *Arch. malad. coeur aiss. sang* 13, 416-26(1920); *Physiol. Abstracts* 6, 332.—A study of the effects of amyl nitrite on blood pressure and, through the vagus center, on the heart in the normal subject and in patients with arteriosclerosis. H. G.

Pharmacological action of crystallized ouabain. A. JAPPELLI. *Arch. sci. biol.* 2, 408-22(1921); *Physiol. Abstracts* 7, 57-8. H. G.

Experimental porphyrinuria. II, III. R. LAFONT AND F. PORTES. *Bull. soc. sci. med. Montpellier* 2, 424-5, 425-6(1921); cf. *C. A.* 16, 756.—Large doses of sulfonal are necessary to produce the effect in guinea pigs, and the amt. of hematoporphyrin in the urine is very small even then. In the rabbit's spleen sulfonal causes the lymphoid nodules to increase in size. The red pulp increases in vol. slightly; this is chiefly due to increased liberation of lymphocytes; the phagocytic activity of the cells on red corpuscles increases. H. G.

Hypersensibility of chloralosed animals to adrenaline. E. BARDIER AND A. STILLMUNKÉS. *Compt. rend. soc. biol.* 84, 766-7(1921); *Physiol. Abstracts* 6, 274.—The intravenous minimal lethal dose of adrenaline for rabbits is 0.33 mg. per kg. After chloral 0.05 mg. per kg. will kill, causing death with pulmonary edema. H. G.

Action of methylene blue on the apparatus of cardiac inhibition of the frog. C. HEYMANS AND E. MAIGRE. *Compt. rend. soc. biol.* 85, 45-8(1921); *Physiol. Abstracts* 6, 313. H. G.

Anticonvulsive action of calcium chloride. Calcium chloride and strychnine. A. PIC, S. BONNAMOUR, AND RAYMOND. *Compt. rend. soc. biol.* 85, 96-7(1921); *Physiol. Abstracts* 6, 390.—A subcutaneous injection of 1 cc. of 10% CaCl₂ will stop convulsions produced by 0.5 cc. of 1 in 10,000 strychnine sulfate in a frog. H. G.

Vasomotor reaction of the suprarenal glands to adrenaline. L. HALLION. *Compt. rend. soc. biol.* 85, 146-9(1921); *Physiol. Abstracts* 6, 382.—In the dog an intravenous injection of adrenaline (4 mg.) causes a diminution in the vol. of the suprarenal gland. H. G.

Adrenaline glucosuria. Caffeine, paralyzing poison of the sympathetic. E. BARDIER, P. LECLERC AND A. STILLMUNKÉS. *Compt. rend. soc. biol.* 85, 281-2(1921); *Physiol. Abstracts* 6, 379.—Caffeine (given as double benzoate of caffeine and soda, 10 cc. 2% soln. intravenously) inhibits adrenaline glucosuria in the rabbit. H. G.

Action of adrenaline and some acids with respect to bacterial toxins. S. TAWARA. *Compt. rend. soc. biol.* 85, 401-2(1921); *Physiol. Abstracts* 6, 457.—The action of adrenaline in rendering mice immune to tetanus toxin is due to the acid which com. samples of adrenaline contain. Strong acids can neutralize tetanus toxin, and, when guinea pigs are used as exptl. animals, diphtheria toxin also. H. G.

Pharmacodynamic study of adrenalone. Vasoconstrictive and respiratory action. Secretory effects. E. JAEGER. *Compt. rend. soc. biol.* 85, 432-3(1921); *Physiol. Abstracts* 6, 454.—Adrenalone is the methylamino deriv. of acetylpyrocatechol. This substance has a sympatho-mimetic action, as previously reported. The action on the respiration is not identical with that of adrenaline. There is not a long period of apnea (as with adrenaline), but there are very short cessations of respiration, or merely a slowing of respiration. Cf. *C. A.* 16, 3973. H. G.

Action of emetine hydrochloride on the heart. F. ARRILLAGA AND J. GUGLIELMETTI. *Compt. rend. soc. biol.* 85, 596-7(1921); *Physiol. Abstracts* 6, 454. H. G.

Action of hypophysis extract on cerebral polyuria. B. A. HOUSSEAU AND E. HUG.

Compt. rend. soc. biol. **85**, 681-3(1921); *Physiol. Abstracts* **6**, 521.—Ext. of posterior lobe of the pituitary produces oliguria in guinea pigs and rabbits when injected subcutaneously, but a polyuria in cats and dogs. This is true for the first few hrs. after injection. Sometimes dogs show a diminished 24-hr. vol. of urine following such injections. The authors say this is due to a lessened consumption of water. In dogs suffering from a polyuria due to the extirpation of the hypophysis 5 days previously, injections of pituitary ext. increased the polyuria. H. G.

Action of quinidine on the heart. F. ARRILAGA, J. GUGLIELMETTI AND C. P. WALDORP. *Compt. rend. soc. biol.* **85**, 683-4(1921); *Physiol. Abstracts* **6**, 524. H. G.

Modifications of leucocytic variations of peptone shock followed by some modifications of the excitability of the organic vegetative system. L. GARREJON AND D. SANTENOISE. *Compt. rend. soc. biol.* **85**, 903-5(1921); *Physiol. Abstracts* **6**, 643.—If peptone is injected into an animal under chloralose, there is a production of shock manifested by a fall in the polymorph cell count. If pilocarpine is injected with the peptone, this fall is intensified, and if atropine is injected with the peptone no fall occurs. H. G.

Active anaphylaxis in guinea pig from arsenobenzenes. C. FLANDIN AND A. TZANCK. *Compt. rend. soc. biol.* **85**, 993-4(1921); *Physiol. Abstracts* **6**, 644.—0.02 g. sulfarsenol injected into the heart of a guinea pig produces no symptoms; 3 days later 0.002 g. are injected, and the animal suffers from a crisis which the authors consider an anaphylactic shock. The animal, however, never dies. H. G.

Paradox of potassium on isolated frog heart. H. BUSQUET. *Compt. rend. soc. biol.* **85**, 1142-4(1921); *Physiol. Abstracts* **7**, 32.—Zwaardemaker has described a paradoxical arrest of the isolated frog heart at the moment when a perfusion fluid contg. U, but no K, is exchanged for a fluid contg. K, but no U. B. has investigated the arrest in the isolated rabbit heart perfused through the coronary circulation, and has produced it by substituting normal Locke-Ringer soln. for the same soln. without K. The stoppage is due to the sudden addn. of K ions to the perfusion fluid, and is simply a K intoxication. There is no need to suppose that a conflict between α and β emanation is the cause. H. G.

Modification of mineral composition of blood and humor after ingestion of calcium chloride. L. BLUM, E. AUBEL AND R. HAUSKNECHT. *Compt. rend. soc. biol.* **85**, 1159-62(1921); *Physiol. Abstracts* **7**, 30.—If renal activity is normal, the administration of Ca, both in men and in rabbits, causes a fall in the Na content of the blood. The K content may increase or decrease. In cases of ascites, the administration of Ca causes Na to enter the ascitic fluid from the blood. When Ca administration ceases, the Na returns to the blood. H. G.

Intravenous injection of colloidal iron for the formation of nonspecific protective substances. HEINZ. *Deut. med. Wochschr.* **46**, 1438(1920); *Abstracts Bacteriology* **5**, 283.—Intravenous injection of colloidal Fe after subsidence of an acute febrile disease stimulates the production of cellular and possibly humoral defenses against secondary infection. H. G.

Influence of thyroid substance on the excretion of water and chlorine in urine of infants. E. SCHIFF AND A. PEIPER. *Jahrb. Kinderheilk.* **44**, 285-94(1921); *Physiol. Abstracts* **6**, 446.—The excretion of water, and to a greater extent that of NaCl, is accelerated by thyroiodin. H. G.

Fate of morphine. III. K. TAMURA. *Mitt. med. Fak. Univ. (Tokio)* **23**, 219-33 (1920); *Physiol. Abstracts* **6**, 525; cf. C. A. **16**, 2914.—The kidneys are permeable to morphine in both acute and chronic poisoning, provided its concn. in the blood exceeds a certain level. Some of the morphine is found in the feces, especially in unaccustomed dogs. The fraction which leaves by this channel is $\frac{1}{3}$ to $\frac{1}{4}$ after large doses, but it

varies with stages of the poisoning. Accustomed animals still show pulse slowing after small doses, for the vagus center exhibits no immunization. H. G.

Submaxillary salivary glands. M. MIWA. *Mitt. med. Fak. Univ. (Tokio)* 24, 79-102(1920); *Physiol. Abstracts* 6, 503.—Atropine does not affect O usage in the submaxillary; pilocarpine increases it, but not much after atropine; its action is compared to the sp. effect salicylic derivs. (e. g., diuretin) have on the kidney. Chorda stimulation had a similar effect, except after atropine; sympathetic stimulation has no effect. H. G.

Iodine tolerance of the human body and iodine therapy. H. C. P. WEBER. *Science* 52, 369(1920).—Tubercular meningitis was cured by dosage with extraordinary quantities of I, given as tincture with various albuminoses and fatty vehicles of administration. The max. was 1 g. of I per day (equiv. to 0.033 g. per kg. body weight); the total equaled 12.35 g. over 22 consecutive days. No iodism was noted. The max. dose of I is not known. Therapeutic effects, as bactericide, require piling up of I in the body. The disturbing effects of KI are often confused with the effects of I itself. H. G.

Effect of hypophysis extract on blood distribution. ROSENOW. *Verhandl. deut. Kongr. inn. Med.* 1921, 152-4; *Physiol. Abstracts* 6, 521. H. G.

Clinical studies of quinidine. II. Alterations in the cardiac mechanism after administration of quinidine to patients with auricular fibrillation with consideration of certain toxic effects of the drug. R. L. LEVY. *Arch. Internal Med.* 30, 451-77(1922).—Observations are reported in detail. Quinidine, though a valuable drug, may produce dangerous paroxysms of ventricular tachycardia. Cf. C. A. 16, 1114. I. GREENWALD

The effect of sodium germanate upon the total hemoglobin of the albino rat. J. E. NOWREY, JR. *Bull. Johns Hopkins Hosp.* 33, 340-2(1922).—Two lots of 7 rats each were used, one for the test, the other as controls. After red cell counts and hemoglobin (Hb) estns. had been made on all, the test rats received 17 mg. Na_2GeO_3 per kg. body wt. One week later, red cell counts and Hb estns. were made on all and the rats were then perfused and a detn. of the total Hb was made on the dil. perfusate. The control rats showed no change in red cell count or Hb content of the blood. In the treated rats, the no. of red cells increased from 8 to 9.5 millions per cu. mm. and Hb from an av. of 10.96 g. to an av. of 11.72 g. per 100 cc. The blood vol. of the treated rats, calcd. from the total Hb and Hb concn. of the blood, was greater than that of the control rats. I. GREENWALD

The comparative toxicity of ammonium salts. F. P. UNDERHILL AND ROBERT KAPSINOW. *J. Biol. Chem.* 54, 451-64(1922).—The toxicity of NH_4 salts to white rats is directly proportional to the amt. of NH_3 present. I. GREENWALD

Hemolysis by morphine and its homologs. H. RHODE. *Biochem. Z.* 131, 560-9 (1922).—Pig blood corpuscles were used. Morphine and its Me, Et, and Bz derivs. hemolyze in increasing order while the bromide, sulfate and phosphate are less effective when the corpuscles have been washed in NaCl soln. When the corpuscles were washed in sucrose soln. the hemolytic effect of all the alkaloids named was weakened, but increased in the series morphine-codine-dionine. Analogous differences were found in hemolysis with NH_4 salts. It seemed as if the corpuscles which had been washed in sucrose were smaller in vol. than those washed in NaCl. F. S. HAMMETT

The value of dimethyldihydroresorcinol (dimedon) in the differentiation of volatile aldehydes in body fluids. The identification of formaldehyde in urine after the administration of urotropine. W. STEPP. *Biochem. Z.* 130, 578-81(1922).—In secondary renal atrophy there was observed a sharp rise in aldehyde excretion detd. as AcH. The rise was 20 to 30 times the normal. The detn. of the m. p. of the condensation product of the aldehyde with dimedon showed the compd. to be HCHO rather than AcH. It was found that the patient had been given urotropine. The possibility of

the use of dimedon in detg. the nature of the aldehyde excreted is noted.

F. S. HAMMETT

The cumulative action of crystalline ouabain. A. C. DIMITRACOFF. *Bull. sci. pharmacol.* 29, 189-91(1922).—Various dilns. of ouabain were administered subcutaneously to 3 dogs in divided doses spread over several days. It was found that an actual accumulation of the drug in the organism occurred. The intoxication exhibited itself as a loss of appetite, emaciation, asthenia, vomiting, thirst and at times diarrhea. Daily doses varying from 0.15 to 0.25 mg. resulted fatally when the amt. injected totaled approx. the quantity equal to the lethal intravenous dose. The mean coeff. of daily elimination was around 0.123 mg. or $1/12$ the fatal dose per kg.

F. S. H.

Intoxication with soapwort. J. DEUMIER AND E. MARTIN-SANS. *Bull. sci. pharmacol.* 29, 379-84(1922).—Report of 2 cases of poisoning from an infusion of soapwort which had stood for a few hrs. The symptoms were delirium and mydriasis.

F. S. H.

New therapeutic applications of calcium salts. E. DESSESQUELLE. *Bull. sci. pharmacol.* 29, 384-91(1922).—A review.

F. S. HAMMETT

Observations on the action of quinidine sulfate on three cases of auricular fibrillation. W. M'L. WALWYN AND J. S. FOWLER. *Edinburgh Med. J.* 29, 65-73(1922).—In a case of auricular fibrillation of influenzal origin, and a case of rheumatic origin quinidine sulfate gave relief and restoration to more normal function. In a case secondary to emphysema of the lungs and arterial disease no beneficial response was observed.

F. S. HAMMETT

A study of the action of astringents. FRANZ MÜLLER. *Deut. med. Wochschr.* 48, 1097-8(1922).—A 3% soln. of basic Al acetate, a 5% soln. of Pb (AcO)₂ or a satd. soln. of Ca(OH)₂ do not, usually, completely inhibit the growth of bacteria in fresh wounds; but in every case a protective layer of pptd. protcins is formed that retards the flow of blood and lymph and sufficiently inhibits the growth of microorganisms so that a normal repair of tissue is possible. The astringents are usually better than strongly bactericidal substances because the latter may also destroy the tissue cells and hence retard the process of repair. The astringent action of the acids is directly proportional not only to their degree of ionization but also to their rate of diffusion. Thus boric and lactic acids are far more strongly astringent to the mucous membrane of the mouth than one would expect from their degree of ionization. The stages in the process of the action of acids upon the mucous membranes are the following: With very dil. acid only a slight swelling of the outer layer is noticeable. Increasing concns. of acid give rise to a wrinkling, then a cracking of the outer layer followed by a sloughing off of the surface. Tannic acid, a true astringent, stops the irritation that is produced by a heavy metal salt in the eye of a rabbit and produces a solidification of the outer layers of the mucous membrane of the mouth with a flattening of the cells. Borax, in substance, shrivels the mucous membrane of the mouth in 8 min. Borax—3% in glycerol—shrivels the outer layers of the mucous membrane markedly in 20 min. and causes considerable swelling in the deeper layers. Borax—10% in glycerol—acting for 8 min. causes the outer layer of cells to slough off. Glycerol alone has no effect. AgNO₃, in concns. up to 10%, has a mild astringent action. In substance, AgNO₃ rapidly corrodes the tissue with which it comes in contact. In 1% soln. HgCl₂ is mildly astringent; in 5% soln. it acts as a mild corrosive. There is no sharp line of demarcation between the astringent and corrosive action of acids or heavy metal salts. Bi salts are pure astringents but their prohibitive cost makes the equally efficient preps. contg. Al hydroxide and silicate preferable for therapeutic use. The paper contains numerous practical applications.

MILTON HANKE

Therapeutic value of chlorophyll. EMIL BURGL. *Deut. med. Wochschr.* 48, 1159-61(1922).—Chlorophyll is so firmly bound in green leaves, etc., that it is liberated to

only an insignificant extent by passage through the intestinal tract. Porphyrin rarely appears in the urine after the ingestion of green foods; it always does after the ingestion of pure chlorophyll. Besides the generally recognized effect of chlorophyll on the production of hemoglobin, B. believes that it has a general stimulating effect upon the body cells. The increased production of hemoglobin after chlorophyll ingestion, B. explains as being partially due to the fact that hemoglobin can be easily synthesized from chlorophyll, but more particularly to the fact that chlorophyll acts as a stimulant to the hemoglobin-producing cells. Chlorophyll when ingested increases the power of the heart beat in cases of cardiac insufficiency, and leads to a reduction of the blood pressure and a clearer cardiogram in arteriosclerotics. Isolated fatigued frog hearts begin to beat again and continue to function for a long time after they are treated with chlorophyll. There seems to be no difference in the action of crude chlorophyll, Mg-free chlorophyll or chlorophylline.

MILTON HANKE

The action of phenylquinolinecarboxyl acid (atophan) on the leucocytes. E. STARKENSTEIN. *Deut. med. Wochschr.* 48, 1161-3(1922).—The statement by B. Mendel that atophan leads first to a destruction of the leucocytes, and then to a leucocytosis, is wrong. M. injected $(\text{CH}_3)_4\text{N}_4$ along with the atophan, and the leucocyte destruction observed by him was caused by the $(\text{CH}_3)_4\text{N}_4$. Atophan ingestion leads to a temporary paralysis of the leucocytes, without increasing their no. or the rate of blood flow, and to an increase in the amt. of uric acid excreted. The uric acid does not, however, come from destroyed leucocytes. Dogs and rabbits excrete less, not more, allantoin after atophan ingestion. An excessive excretion of uric acid occurs in normals only after the first few doses of atophan; then the excretion becomes subnormal. In gouty patients, an increase in the uric acid output may continue for a long time. The beneficial effect of atophan upon inflammatory conditions may be attributed to its paralyzing effect upon the leucocytes.

MILTON HANKE

Experiences with silver neoarsphenamine. R. SCHILLER. *Deut. med. Wochschr.* 48, 1307-8(1922).—Ag neoarsphenamine rapidly destroys spirocheta and removes the clinical findings in syphilis. Side reactions are seldom obtained and are always less severe than in the case of the other arsphenamine preps. Angioneurosis is seldom associated with Ag neoarsphenamine injections. This condition can always be avoided by allowing the soln. to stand for 10 min. before it is injected and then injecting very slowly.

MILTON HANKE

The dependence of the bactericidal action of quinine alkaloids upon the alkalinity of the medium. L. MICHAELIS. *Klin. Wochschr.* 1, 321-2(1922).—The bactericidal value of the quinine derivs., *in vitro*, was tested in two ways. A series of albumin- and peptone-free buffer solns. with a p_H varying from 3.5 to 8 was treated with equal amts. of eucupine, and was then inoculated with equal amts. of fresh cultures of *Staphylococcus pyogenes aureus*. After 24 hrs. of incubation, portions of each of the liquids were transferred to agar plates and reincubated. Eucupine was without bactericidal action at concns. below 1-50,000, regardless of the p_H . It is most effective at a p_H of 8.0 and decreases in effectiveness as the p_H drops, so that at a p_H of 6.0, a eucupine concn. of 3-10,000 is required for complete bacterial inhibition. The second method of experimentation was as follows: A series of tubes contg. bouillon, a concn. of eucupine of 3-100,000, and ranging in p_H from 3.0 to 9.0 was inoculated with *Staphylococcus pyogenes aureus*. A set of control tubes contg. no eucupine but similar in every other respect was prepd. at the same time. The eucupine-free tubes showed growth in all tubes excepting the ones having a p_H of 3.0 and 9.0. A growth was not obtained in the eucupine-treated tubes at a p_H above 7.4. The most effective p_H range for eucupine activity is between 7.4 and 8.0. Since the blood has a p_H of 7.3, eucupine would be effective here as a bactericidal agent. In normal tissue, p_H about 7.0, and especially

in inflamed areas, pH about 6.5, it would be quite inactive. Since it is the un-ionized portion of an alkaloid, the free base, that is active as a bactericidal agent, some base weaker than eucupine, or than any of the known quinine derivs., but equally effective as an antiseptic, must be found if beneficial action is to be obtained in an inflamed area.

MILTON HANKE

Activity evaluation of *Urginea scilla* (squill). JOSEPH MARKWALDER. *Klin. Wochschr.* 1, 212-15(1922).—The digitalis-like activity of the combined glucosides in squill was quantitatively estd., biologically, by injecting known doses into the lymph sac of frogs. The min. lethal dose per g. of frog was taken as the mean between the max. dose that was just inactive and one that was just active. This value is referred to as a frog dose (F. D.). This F. D. is used merely as an index for evaluating the quantities of active principle in squill and should not be confused with the min. lethal dose for man. The squill glucosides, taken collectively, have an activity like that of the digitalis glucosides; the heart stops in systole. The material to be tested, fresh bulbs or dry powder, was exhausted with alc. and water. The colloids are easily removed and there remains an ext. contg. only the active glucosides and the carbohydrates. Fresh squill, freed from the exterior dead leaves, contains from 4.0 to 8.55 million F. D. per kg. of dry material. Drying *in vacuo* or in air does not destroy the glucosides. There is no appreciable difference between the glucoside content of red and white squill. The heart of the bulbs and the dead exterior leaves contain very little glucoside. The mature intermediate leaves are rich in glucoside. A sample of com. dried powder contained 1.5 million F. D. per kg. The so-called exts. of commerce do not deserve to be so-called because they contain less glucoside than the starting material. The com. tincture is valueless because it is quite inactive.

M. H.

Clinical narcosis investigations with salesthin (methylene chloride). ALEXANDER HELLWIG. *Klin. Wochschr.* 1, 215-17(1922).—Inhalation of CH_2Cl_2 leads to an analgesic type of narcosis within one minute. The effects are described in detail. CH_2Cl_2 is worthless as an anesthetic beyond the analgesic stage because the stage of muscle relaxation is so near the dangerous borderline of respiratory inhibition and complete collapse. As an analgesia producer to be used alone for short operations, or in conjunction with morphine-scopolamine and a local anesthetic in protracted operations, or as antecedent to ether, CH_2Cl_2 is superior to any of the other analgesic anesthetics. When used in this way, there are no bad after-effects. There is no nausea.

M. H.

The question of sero- and chemotherapy in otogenous and rhinogenous meningitis. OTTO FLEISCHMANN. *Klin. Wochschr.* 1, 217-20(1922).—A series of dogs, weighing 10 kg. each, were given an intravenous (jugular) injection of trypanflavine (diaminomethylacridinium chloride). Samples of spinal fluid obtained by lumbar puncture about 3 hrs. after the injection were uniformly free from trypanflavine. The intact meninges do not permit the passage of trypanflavine into the spinal fluid. An intravenous injection of 50 cc. of a 2% trypanflavine soln. in several cases of meningitis invariably led to the appearance of appreciable quantities of the dye in the spinal fluid. In one case the dye was still present 4 days after the injection. The inflamed meninges are permeable to trypanflavine and they are, therefore, probably also permeable to many other substances. From this it would appear that the chem. treatment of meningitis could be carried out *via* the blood stream. This is better, in any case, than an intraspinal injection because substances injected into the spinal fluid remain largely in the region of injection excepting insofar as they are absorbed into the blood stream. Motion of the injected material in the spinal fluid must occur largely by the slow process of diffusion.

MILTON HANKE

Metabolism after sulfur injections. ROBERT MEYER-BISCH. *Klin. Wochschr.*

1, 575-8(1922).—The parenteral injection of an olive oil soln. of pure S leads to an increased mobility of the joints and a complete cessation of pain in cases of primary chronic polyarthritis and chronic polyarthritis rheumatica. The injection of 5-10 cc. of a 1% S soln. in oil leads to a marked rise in body temp., a doubling of the total N output, an absolute and percentage decrease in the neutral S excretion, glucuronuria, urobilinuria, leucocytosis, and a loss in body wt. The injection of 5 mg. of S produces no fever and does not increase the total N output but does increase the excretion of glucuronic acid, urobilin and neutral S and produces a mild leucocytosis. B. recommends the parenteral injection of 5 cc. of a 1% soln. of S in olive oil for the treatment of chronic joint diseases.

MILTON HANKE

Bulbocapnine catalepsis. H. DE LONG. *Klin. Wochschr.* 1, 684-5(1922).—The injection of 30-40 mg. of bulbocapnine HCl into a cat produces a catalepsy-like condition which, however, cannot be called a true state of catalepsy. The animal is still capable of considerable voluntary motion. Any one of the legs that is not being used to support the body assumes a resting position and will not remain in any other. If one of the cat's legs is novocainized before the injection of bulbocapnine, this leg becomes as "cataleptoid" as the other three. Tetanic contractions play the chief role in bulbocapnine catalepsis.

MILTON HANKE

An X-ray study of the effect of atropine on the motility of the stomach. C. H. LASCH. *Klin. Wochschr.* 1, 840-5(1922).—The effect of an intravenous injection of 1-1.5 mg. of atropine on the motility of the stomach in health and disease was studied as follows: The patients were fed a meal contg. BaSO₄. The normal tonus of the stomach musculature and the duration, frequency, and intensity of the peristaltic waves were then detd. The injection of atropine leads to the following changes in tonus and peristalsis: Hypo- and ortho-peristalsis are unchanged. Hyperstalsis is almost invariably reduced. Hypotonus is unchanged. Orthotonus is slightly reduced. Hypertonus is almost invariably relaxed. The relaxation of a hypertonic stomach always gives rise to a feeling of relief and frequently to a complete cessation of pain. The time of evacuation of the stomach is increased. Atropine does not relax a pyloric spasm but invariably completely relaxes a spasm of the antrum pylori.

MILTON HANKE

The beneficial and harmful action of arsphenamine. J. JADASSOHN. *Klin. Wochschr.* 1, 1193-9(1922).—A review.

MILTON HANKE

Ergot preparations. HEDE HALPHEN. *Klin. Wochschr.* 1, 1149-51(1922).—The action of a large number of commercial ergot preps. on the excised virgii guinea pigs uterus was compared. The best of these preparations was 1100 times as powerful as the poorest. The individual variations were enormous. Most of the preps. contain reducing substances and inert materials that can be pptd. with alc. and Pb(OAc)₂. If the ergot powder is suspended in water and set aside, a bacterial fermentation occurs that removes the sugars and most of the colloidal substances. The concd. filtrate is miscible with alc. in all proportions, gives no ppt. with Pb(OAc)₂, is physiol. highly active, and can be injected without local pain or irritation.

MILTON HANKE

The treatment of neurotic respiratory tetany with ammonium phosphate. O. PORGES AND D. ADLERSBERG. *Klin. Wochschr.* 1, 1200-1(1922).—Hysteria that is accompanied by excessive breathing may lead to tetany. These tetanic manifestations disappear when steps are taken to produce a systemic acidosis. This can be accomplished by feeding foods deficient in carbohydrates, by inhaling CO₂-laden air, by exercising vigorously, or by ingesting NH₄H₂PO₄. The last is recommended.

M. H.

Ergot preparations. W. HEUBNER. *Klin. Wochschr.* 1, 1456(1922).

M. H.

Poisoning with eucalyptus oil. W. WITHAUER. *Klin. Wochschr.* 1, 1460-1(1922).—Contains a complete report of one case of severe eucalyptus oil poisoning, a review of the general pharmacol. action of the oil, its chem. compn. and its most common uses.

MILTON HANKE

The effect of medicines upon, and the sensitiveness to poisons of, the cells and tissues. HANS HANDOVSKY. *Klin. Wochschr.* 1, 1541-2(1922). A review. M. H.

Studies on the pituitary. I. The melanophore stimulant in posterior lobe extracts. L. T. HOGGEN AND F. R. WINTON. *Biochem. J.* 16, 619-30(1922).—See C. A. 16, 3512.

BENJAMIN HARROW

The cardiac, hemolytic and nervous effects of digitonin. FRED RANSOM. *Biochem. J.* 16, 668-77(1922).—"Monomolecular combinations of digitonin with phytosterol, coprosterol, β -cholestanol are non-toxic for red blood cells and for the frog heart; any excess of digitonin beyond this proportion can be detected by the action of the soln. upon the red cells and upon the heart. Pseudocoprosterol does not affect the activity of digitonin. Digitonin mixed with an emulsion of brain substance loses its toxicity for red cells and for the heart. It is suggested that the toxic action of digitonin upon red blood cells, cardiac muscle cells and cells of the central nervous system (fishes) is essentially the same—it attacks a substance allied to or identical with cholesterol which is present, free and not esterified, in the various cells. This free sterol has in each case so important a physiol. function to perform that its inactivation by combination with digitonin leads to a profound modification of the physiol. activities of the respective cells." Digitonin is absorbed from soln. in water (e. g., 1 in 25,000) by animal charcoal, kaolin and starch. Cholic acid does not affect the action of digitonin.

BENJAMIN HARROW

Blood coagulation after administering euphyllin. KARL ADDICKS. *Deut. Arch. klin. Med.* 140, 117-21(1922).—Euphyllin, given orally, in doses of 0.1-0.2 g. causes a diminution of the coagulation time of blood lasting 2-3 hrs. In doses 0.3-0.4 g., the action lasted 5-7 hrs. The coagulation time was reduced in most cases 75%. In patients with their spleens removed and in the hemorrhagic diatheses euphyllin showed its styptic action. This substance is to be placed along with serum, NaCl, CaCl₂ and gelatin as a useful substance in treating hemorrhages.

J. H. L.

The clinical value of mercuriophen in the treatment of gonococcal urethritis. C. H. DE T. SHIVERS. *J. Urol.* 8, 35-48(1922).—Mercuriophen has yielded uniformly good results in the treatment of gonococcal urethritis and particularly in acute infections. All cases with the exception of 3 showed a considerable decrease in the no. of infected cells per field after the 1st and 2nd treatments. The solns. of mercuriophen employed in this study were 1 : 4000 and 1 : 10000; these produced slight or no irritation of the urethra. All treatments with mercuriophen should be preceded by thoroughly cleansing the parts to be treated with a warm 1 : 8000 soln. of KMnO₄.

J. H. L.

The action of benzyl benzoate and morphine on the vesical sphincter. W. J. STARR. *J. Urol.* 8, 239-45(1922).—The normal intravesical pressure and sphincter tone varies greatly in rabbits. The administration of morphine to rabbits is followed by a marked increase in the sphincter tone. Benzyl benzoate lowers the sphincter tone both in normal rabbits and in those with an increased tonus due to the previous administration of morphine. These exptl. findings are consistent with the clinical observations of bladder distension relieved by benzyl benzoate, in cases which have or have not had therapeutic doses of morphine.

JULIAN H. LEWIS

The pharmacological value of colloidal mercury. T. SUGANA. *J. Kyoto Med. Soc.* 19, Nos. 8-9(1921); *Japan Med. World* 2, 55.—The toxicity of colloidal Hg is greater than that of "immanicol," but less than that of HgCl₂. After the injection of colloidal Hg more Hg is found in the brain and in the small intestines than after the injection of other Hg compds.

M. E. MAVER

The alkaloid of granatum. G. MAEBO. *J. Kyoto Med. Soc.* 19, No. 8-9(1921); *Japan Med. World* 2, 55.—M. prepd. the hydrochlorate salt of the whole alkaloid of granatum. It was 25 times as toxic for the frog and mouse as the crude granatum.

M. E. MAVER

The action of methoxycaffeine. Y. YOSHIKAWA. *J. Kyoto Med. Soc.* 19, Nos. 8-9(1921); *Japan Med. World* 2, 55.—Methoxycaffeine has a stronger paralytic action on the central nervous system than caffeine, and at the same time it is less stimulating to the reflexes. It increases the rigidity of the skeletal muscles as caffeine does. For clinical purposes methoxycaffeine is as specifically adapted as ethoxycaffeine for neuralgia and for cases in which stimulation is contraindicated.

M. E. MAVER

The pharmacology of small molecular albumin derivatives. Y. NISHIMURA. *J. Tokyo Med. Soc.* 35, No. 11(1921); *Japan Med. World* 2, 79.—The residues from pepsin and trypsin prepn. as obtained by the adsorption with kaolin dilate the pupil of the frog. The mol. albumin is prepd. from casein by treating with strong H_2SO_4 . The intestinal contents of the rabbit and the dog were found to contain substances having the same action.

M. E. MAVER

The active principle of Korean ginseng. K. ABE AND I. SAITO. *Japan Med. World* 2, 166-8(1922).—The substance in ginseng which has an inhibitory action on adrenalectomy hyperglucemia is not extd. by petroleum ether or ether, but by pure alc. The active principle of ginseng is a glucoside.

M. E. MAVER

"Hishilen," a new mercury antilnetic. SATOSHI TAKENAKA AND HAJIME ISHIMARU. *Tokyo Med. News* No. 2266(1922); *Japan Med. World* 2, 169.—The authors report expts. on animals and the human application of "Hishilen." 1 cc. of the prepn. contains 0.066 g. of Hg thiosalicylate. It is an easily sol. substance, and gives no ill effect on repeated injection.

M. E. MAVER

The toxicity of arsonon and arsenic trioxide. H. INOUE. *Tokyo Med. News* 2248(1921); *Japan Med. World* 2, 44.—The As content of As_2O_3 is 13 times that of arsonon. They produce similar intoxicating effects, those of arsonon being much milder.

M. E. MAVER

The therapeutic value of quinidine in the treatment of auricular fibrillation. A. E. CLARK-KENNEDY. *Quart. J. Med.* 15, 279-312(1922).—Twenty unslected cases of auricular fibrillation were treated with quinidine, and in 17 normal cardiac rhythm returned. In all cases the dosage was pushed to the max. which was considered safe. The majority of cases unless well compensated were given long courses of digitalis prior to the administration of quinidine. With the exception of those cases in which the normal rhythm was quickly restored certain symptoms of intoxication appeared, but they usually passed away spontaneously without any reduction of the quinidine.

JOHN T. MYERS

Quinidine sulfate in cardiac disease. JOHN HAY. *Quart. J. Med.* 15, 313-17(1922).

JOHN T. MYERS

Physiological section of nerves by novocaine. MIGUEL OZORIO DE ALMEIDA. *Arch. intern. pharmacodynamie* 26, 329-40(1922).—While the study is still incomplete and the results are not always concordant, A. reports the following positive findings: Novocaine interrupts the conduction of sensory and reflex stimuli, and the conduction of motor excitations is also blocked. It produces total physiol. section of a mixed and complex nerve like the pneumogastric nerve. The nerve section by novocaine is under normal conditions essentially transitory, and the diffusion or absorption of the anesthetic is followed by the reestablishment of the cond. of the nerve. This implies that the action of novocaine cannot be explained in terms of curarizing action or by a sp. influence upon the sensory nerve endings. The effect of novocaine is also exercised upon nerve trunks whose cond. is completely abolished by it in all forms.

W. A. P.

Pharmacological study of emetine. PIETRO-MARIA NICCOLINI. *Arch. intern. pharmacodynamie* 26, 375-93(1922).—N. found that *ipeacac* produces contractions of the intestine, while its active principle, emetine, has the opposite effect. As *ipeacac* is altered with duration of time the action of emetine becomes more pronounced. After

sepg. the alkaloids of the drug by the Flückiger-Beck method the mixt. of the alkaloids does not show this stimulating action, but displays the effect of emetine, which is, however, greatly reduced. Ipecac exercises the same effect as emetine upon muscle fibers.

W. A. PERLZWEIG

Action of arsylene (monosodium propenyl arsenate). S. KATZENELBOGEN. *Arch. intern. pharmacodynamie* 26, 408-20(1922).—The toxic dose of arsylene for rabbits when given parenterally is 0.075 g. per kg. body wt.; the maximal dose tolerated is 0.05 g. per kg. Arsylene is not hemolytic *in vitro* and does not influence the resistance of the blood cells. In acute intoxication produced by the maximal dose the no. of red blood cells and hemoglobin are but slightly diminished, while in the white cell distribution the neutrophil cells are increased at the expense of the lymphocytes. In chronic intoxication the red cells are slightly diminished but in the white cell count the curve obtained in acute intoxication is reversed, *i. e.*, the lymphocytes are increased at the expense of the polynuclear cells. When administered in therapeutic doses arsylene provoked a rise in the red cell count without a corresponding increase in hemoglobin, the no. of leucocytes being variable. These findings correspond to clinical experience in arsenical treatment.

W. A. PERLZWEIG

Intoxication by *Carlina gummifera*. IV. Chemical and pharmacological study of some salts and derivatives of atractylic acid and of their action in relation to chemical constitution. LUIGI TOCO. *Arch. intern. pharmacodynamie* 26, 421-39(1922); cf. C. A. 16, 3972.—The general pharmacol. action of K atractylate and of its derivs. is about the same, and it is ascribed to the presence of the fundamental substance (radical) *atractyligenin*. When isolated and purified, atractyligenin is inactive, but it becomes toxic when combined with glucose to form *atractyline*. The introduction of H_2SO_4 renders the mol. more stable, more toxic and more sol. The introduction of valerician acid into the mol. renders it less sol. and attenuates its toxicity. The presence of K confers upon the mol. a convulsant action in the medullar region.

W. A. P.

Hyperthermia and increase of the respiratory volume and of the elimination of carbon dioxide produced by methylene blue. J. F. HEYMANS AND C. HEYMANS. *Arch. intern. pharmacodynamie* 26, 443-83(1922).—Methylene blue when administered to dogs in doses of 40-60 mg. per kg. produces a strong hyperthermic effect, the temp. rising in less than 1 hr. to 44-45°. This rise of temp. up to 44° is not fatal to dogs. The respiratory vol. increases progressively with the temp. rising from 0.3 to 0.4 l. per min. per kg. to 1.5-2.0 l. up to 43°; above 43° it diminishes until death occurs at 44-45°. The hyperthermia is accompanied by a greatly increased CO_2 production, which rises from 10 to 11 cc. per min. per kg. at normal temp. to 35-40 cc. at 43-44°. The increase of CO_2 elimination is relatively greater and more rapid than the rise of temp., and it persists up to a few mins. before death. The total amt. of CO_2 eliminated indicates a large loss of heat through an increased metabolic rate. It is believed that the hyperthermia is provoked by the augmented metabolism. Methylene blue does not produce convulsions or muscular hypertonicity along with the elevated temp. In dogs showing muscular resolution caused by curare or by chloral, methylene blue arrests the fall of body temp. and then brings it back to the normal level. In dogs previously treated with chloralose the dye provokes a maximal hyperthermia with a parallel increase in CO_2 elimination. Since methylene blue does not act by means of increased tonus or muscular convulsions the authors conclude that its effect is due to a direct or indirect effect on cellular metabolism. The direct effect is possibly one of a catalyzer upon the oxidative processes; the indirect effect may come to the cells through the stimulating action of the dye upon one or the other nervous system. By combining methylene blue with chloralose it is possible to produce with this mixt. in animals a typical febrile state involving the 3 salient symptoms of temp., respiration and circulation.

W. A. P.

Treatment of leprosy with ethyl esters of chaulmoogra oils. F. ENGEL. *Arch. Schiffs.-Tropen Hyg.* 26, 161-4(1922).—A claim of priority in the discovery and use of esters of fatty acids of chaulmoogra oil in the treatment of leprosy. The identity of the substance used by E. had evidently been kept secret and used under its common trade name "anti-leprol."

W. A. PERLZWEIG

A trial of eucalyptus infusion in diabetes. H. L. JOHN. *J. Metabolic Research* 1, 489-95(1922).—Infusions of eucalyptus leaves were previously reported to be of benefit in the treatment of diabetes. The trials were conducted at the request of the National Research Council. Infusions of eucalyptus were administered to diabetic patients in various stages of severity of the disease and in no case was there any noticeable effect upon the progress of diabetes.

W. A. PERLZWEIG

Phenol-lipoid N in experimental infection by *Micrococcus melitensis*. (Chemotherapeutic notes.) ALFREDO CARINI. *J. Trop. Med.* 25, 1-2(1922).—*In vitro* and *in vivo* expts. are cited showing that Piazza's phenol-lipoid N (cf. *C. A.* 14, 2838) possesses strong bactericidal and antitoxic properties in infections with *M. melitensis*. In the animal expts. one cc. of a 10% soln. of the compd. in oil was administered daily subcutaneously to guinea pigs infected with a fatal dose of the organism. Most of the animals so treated survived, and during the course of the treatment a distinct lowering of the fever was observed.

W. A. PERLZWEIG

Progress report of the treatment of leprosy by the intravenous injection of chaulmoogra oil. PHILIP HARPER. *J. Trop. Med.* 25, 2-4(1922).—H. reports definite improvement in 28 out of 38 cases of leprosy treated at Makogai, Fiji.

W. A. P.

Antimony in the treatment of lepers and hydatid disease. F. G. CAWSTON. *J. Trop. Med.* 25, 27-8(1922).—A report of a few favorable results.

W. A. P.

The emetine treatment for bilharzia disease. F. G. CAWSTON. *J. Trop. Med.* 25, 112-3(1922).—Clinical reports of successful treatment.

W. A. P.

Freshly dissolved tartar emetic in venereal diseases. F. G. CAWSTON. *J. Trop. Med.* 25, 126-7(1922).—A few favorable results are described.

W. A. P.

Dangers of rapid intravenous injection of concentrated solutions of quinine dihydrochloride. U. N. BRAHMACHARI. *J. Trop. Med.* 25, 209-11(1922).—Because of the dangerous fall in blood pressure following rapid injections of concd. solns. of quinine (cf. *C. A.* 15, 1576), B. recommends that in the treatment of malaria 10 grains of quinine-HCl dissolved in 200 cc. of saline be injected in 20 minutes, or at the rate of $\frac{1}{2}$ grain per min. Protocols are given showing the maintenance of normal blood pressure when the recommended procedure is followed.

W. A. PERLZWEIG

Plant dermatitis. H. N. RIDLEY. *J. Trop. Med.* 25, 225-7(1922).—The sap or latex of the trees *Gluta benghas* and *Melanorrhoea wallichii* of the order *Anacardiaceae* found in the Malayan Peninsula produces on contact with the skin an extensive dermatitis. The toxic substance in the sap is thought to be analogous to that isolated from the sap of *Rhus vernicifera*, the Japan lac.

W. A. PERLZWEIG

Intolerance of quinine. MILFORD E. BARNES. *J. Trop. Med.* 25, 246-8(1922).—A case report of a malarial patient in whom quinine administration caused severe exfoliation. Immunity to quinine could not be produced by repeated small doses.

W. A. PERLZWEIG

Experimental basis of arsenotherapy in syphilis by the intramuscular route. M. POMARET. *Presse med.* 30, 124-6(1922).—P. employs "preparation 132," which is prepd. from arsphenamine by neutralization with Na_2CO_3 and liberation of the base. The base dissolved in glucose or lactose solns. was administered intramuscularly; it was considerably less toxic than other arsphenamine preps. and possessed greater bactericidal activity.

W. A. PERLZWEIG

Diaminoarsenophenol (132) in the treatment of syphilis by the intramuscular

route. F. JEANSELMÉ, E. POMARET AND MARCEL BLOCH. *Presse med.* 30, 397-9 (1922); cf. preceding abstr.—Clinical report of 150 cases successfully treated.

W. A. P.

Bismuth stomatitis. ROBERT AZOULAY. *Presse med.* 30, 134-8 (1922). W. A. P.

The treatment of inflammations of the serous membranes with calcium chloride. LEON BLUM. *Presse med.* 30, 221-5 (1922).—A combination of CaCl_2 and of a salt-free diet is claimed to be of signal benefit in the treatment of various types of pleuritis. From 15 to 30 g. $\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$ was administered by mouth daily mixed with equal amts. of sol. starch and lemon sirup. The latter 2 ingredients were included to avoid the emetic effect of the salt. The treatment is based on the well known effect of Na in causing water retention by the tissues and in raising the temp. and upon the directly antagonistic effect of Ca in these respects.

W. A. PERLZWEIG

Does mercury cure syphilis? L. CHEINISSE. *Presse med.* 30, 346-7 (1922).—A review concluding with a positive answer to the question.

W. A. P.

Present status of iron in therapeutics. L. CHEINISSE. *Presse med.* 30, 390-1 (1922).—A critical review.

W. A. P.

Carbon monoxide poisoning. ALBAN GIRAULT AND ANDRÉ RICHARD. *Presse med.* 30, 556-7 (1922).—CO poisoning was followed by gangrene and retention of urine and feces.

W. A. P.

Bismuth in the treatment of syphilis. C. LEVADITI. *Presse med.* 30, 633-6 (1922).—A review of recent French work. Bi therapy yields results superior to Hg treatment and equal to those with As drugs. The prepn. with which L. had the best results is Na K bismuthate tartrate.

W. A. P.

Arsenical treatment in anemias. L. CHEINISSE. *Presse med.* 30, 646-7 (1922).—A review.

W. A. P.

Progress in the treatment of leprosy. F. NOC. *Rev. hyg.* 44, 956-68 (1922).—A review with bibliography on the use of chaulmoogra oil, its fatty acids and their derivs., and of colloidal Sb.

A. P.-C.

Silver-neoarsphenamine. K. ULLMANN. *Wiener klin. Wochschr.* 35, 316-22 (1922).—A review of clinical studies with silver neoarsphenamine and silver arsphenamine in the treatment of various forms of syphilis. The results were mainly favorable.

W. A. PERLZWEIG

Intravenous silicic acid therapy in pruritus senilis. F. LUTHELEN. *Wiener klin. Wochschr.* 35, 349 (1922).—On the basis of the alleged loss of SiO_2 in human tissues with age and the former use of silicates in arteriosclerosis, L. injected intravenously 1-2 cc. of 1% Na_2SiO_3 soln. into pruritus cases with frequent favorable results.

W. A. PERLZWEIG

Reinforcement of cocaine action by hypertonic glucose solutions. W. ZEMANN. *Wiener klin. Wochschr.* 35, 394-5 (1922).—On the basis of Stejskal's work (C. A. 16, 2924) Z. used cocaine with 10% glucose solns. for local anesthetic effects in otolaryngological practice. He found that the narcotic effect of the cocaine was delayed but lasted much longer, less cocaine was required and that the general after-effects were of a more desirable nature.

W. A. PERLZWEIG

Pyrogallol, cignolin and the anti-psoriasis effect. P. G. UNNA. *Wiener klin. Wochschr.* 35, 387-9 (1922).—A theoretical discussion of the chem. mode of action of polyhydroxy phenols and of anthranol derivs. (1,8 dihydroxyanthranol, cignolin and chrysarobin) upon the various skin layers. The powerful activity of the hydroxyanthranols is ascribed to the reaction with the oleic acid of the skin.

W. A. P.

Arsenic action, arsenic immunity and arsenic poisoning. With special consideration of the different therapeutic methods of administration. K. ULLMANN. *Wiener klin. Wochschr.* 35, 455-9, 479-83, 502-6 (1922).—An extensive review of the chemistry,

pharmacology and therapeutic role of the different groups of As compds., as well as of their comparative effectiveness under the various methods of administration. In both the parasitotropic and organotropic respects the trivalent inorg. and org. As preps. were found by U. more active than the pentavalent preps. The amt. and the rate of As elimination by the subject are not directly proportional to the activity of the As, P, Sb and other similar drugs. The immunization to As is discussed from the standpoint of histological changes in the liver. A large bibliography is appended. W. A. P.

Iodoform formation on the mucosa of the bladder by means of administration of potassium permanganate. KARL PREIS. *Wiener klin. Wochschr.* 35, 566(1922).—A 1 : 4000 soln. of KMnO_4 is injected into the bladder of a patient receiving KI by mouth. The returned irrigation fluid contained CHI_3 . No report of therapeutic effects is given.

W. A. PERLZWEIG

Action of tribromoxyleneol on tubercle bacilli. MISS T. DUROC. *Compt. rend.* 175, 326-8(1922).—Tests were made upon the bacilli of bovine, human and avian tuberculosis, accompanied by suitable controls and with care to exclude foreign bacilli. Tribromoxyleneol causes a disappearance of acid resistance followed by complete dissolution of tuberculous bacilli. This action is less rapid with avian bacilli than with bovine or human bacilli of the same age.

L. W. RIGGS

Flumerin—A new mercurial for the intravenous treatment of syphilis. E. C. WHITE, J. H. HILL, J. E. MOORE AND H. H. YOUNG. *J. Am. Med. Assoc.* 79, 877-82 (1922).—The drug is the disodium salt of hydroxymercurifluorescein, $\text{C}_{20}\text{H}_{10}\text{O}_4\text{Na}_2\text{Hg}$, whence the simplified name *flumerin*. It is a dark red powder with greenish iridescence, sol. in H_2O up to about a 10% soln. The soln. used clinically is 2% and is stable to the air and to heat. The powder is stable in air though somewhat hygroscopic and should be kept well corked. Solns. of the drug give no ppt. with NaOH , iodides or serum. $(\text{NH}_4)_2\text{S}$ on long standing, or immediately on boiling, gives a ppt. of HgS . This drug is effective in eradicating exptl. syphilis in rabbits in doses which are well tolerated. In large doses it causes little or no clinical injury to the kidneys of animals. Definite proof of its value as an antisyphilitic drug was found in 96 human cases. Doses contg. from 8 to 20 times the amt. of Hg present in the therapeutic dose of other Hg drugs commonly used intravenously were given with impunity. The max. dose which may be employed serially in the human being has not yet been detd. The therapeutic effects of the drug have been shown in primary, secondary and tertiary syphilis by the resolution of lesions and the reversal of positive blood Wassermann reactions. The no. of cases treated are sufficient to demonstrate that this mercurial is of value, but too small to permit the allocation of the drug to a definite place in the therapy of syphilis.

L. W. RIGGS

Tetrachloroethane poisoning. FROIS. *Bull. acad. med.* 88, 40(1922); *J. Am. Med. Assoc.* 79, 1000; cf. Minot, C. A. 16, 753.—In 12 fatal cases reported in England the liver and kidneys suffered most. Ordinary ventilation is not enough to prevent toxic action from the absorption of the fumes of this solvent. The fumes are heavy and should be drawn down and out by means of an exhaust fan. Also in *Rev. hyg.* 44, 987-92(1922).

L. W. R.

Circulation of phenolsulfonephthalein in the cerebrospinal system. H. C. SOLOMON, L. J. THOMPSON AND H. M. PFRIFFER. *J. Am. Med. Assoc.* 79, 1014-20(1922).—Thirty-nine patients were divided into 8 groups according to the method of introducing the dye. One cc. of neutral phenolsulfonephthalein will diffuse through 49 cc. of cerebrospinal fluid in 30 min., showing an equal intensity of color throughout. This holds true when the dye is placed either at the top or bottom of the column of fluid. Blood serum shows no tendency to diffuse upward; one cc. of serum placed at the bottom of a column of cerebrospinal fluid remained at the same level for more than 10 hrs. Serum

mixed with the dye when placed at the top of a column of fluid settled rapidly to the bottom carrying the dye with it. From this point the dye diffused to a certain extent while the serum remained stationary. In the expts. with patients the dye was introduced by various methods and after 7 to 70 min. fluid was withdrawn and tested for the dye. The results seem to show that there is a direct communication between the various loci of the fluid system but that the interchange between these different areas is slight.

L. W. RIGGS

Treatment of carbon monoxide asphyxia by oxygen and carbon dioxide inhalation. YANDELL HENDERSON, H. W. HAGGARD AND STUART SCOTT. *J. Am. Med. Assoc.* 79, 1137-45(1922).—A special inhaler is described for which neither the ordinary pulmotor nor any other app. now available is capable of similar functioning. The original paper should be consulted for details of many important expts. and the exact directions for using the special inhaler. The conclusions are that manual artificial respiration by the prone pressure method should be employed, when respiration has stopped, to start spontaneous breathing. This object may be assisted by administering O and CO₂ simultaneously. Inhalation of O and 5% CO₂, by causing a very full ventilation of the lungs, rapidly eliminates CO from the blood and thus terminates the condition of asphyxia. This treatment is highly effective and may be carried out by intelligent persons. Until more definite knowledge has been obtained regarding the effects of CO, and until treatment based on that knowledge has been tested, no other treatment than the above mentioned is recommended.

L. W. RIGGS

History of iodine treatment of goiter. E. BIRCHER. *Schweiz. Med. Wochschr.* 52, 713(1922); *J. Am. Med. Assoc.* 79, 1004.—Burnt sponge was used in the treatment of goiter from the earliest days of history, its value being in the I it contains. I was isolated in 1811 and Coindet extolled it in treatment of goiter in 1820, but added that it should be given only under strict medical supervision. The present popular fad of I prophylaxis for goiter, whereby school children are given I in their drinking water and people generally in goiter districts are drugging themselves with I, is causing much harm. In one case a necropsy revealed 380 mg. of I in a 400 g. thyroid, the physiologic content of I in the thyroid being 2 to 9 mg. The pharmacology of I is so uncertain and the results with it are so contradictory, that it is a dangerous expt. to give this poison in food or drinks on an extensive scale and for long periods.

L. W. RIGGS

Gas warfare. Effects of poisonous gases—early and late. W. R. GALWEY. *U. S. Naval Med. Bull.* 17, 230-42(1922).—The gases used are classified by their actions into the following 6 groups: lachrymators, sensory irritants of the eyes, nose and upper respiratory passages, vesicants, asphyxiants or acute lung irritants, direct poisons of the nervous system, and gases which act by interference with the respiratory property of the blood. The action of these gases upon the tissues and the symptoms produced are described with much detail.

L. W. RIGGS

Permeability of cells and tissues. VIII. The question of the distribution of hormones and drugs in the blood. HANS SCHAEFFL. *Biochem. Z.* 122, 232-50(1921).—The distribution of BaCl₂, choline bromide, and nicotine between corpuscles and plasma or serum was detd. by a physiol. method, Fuhner's nerve-free leech prep. being used. The corpuscles are impermeable to Ba, but nicotine and choline both distribute themselves equally in plasma or serum and corpuscles.

J. C. S.

The pharmacology of the autonomic system. TORALD SOLLMANN. *Physiol. Rev.* 2, 479-504(1922).—A critical review discussing particularly the question of specificity of the action of different drugs on the somatic, sympathetic and parasympathetic nerve system. Also a discussion of the evidence on the point of attack of autonomic drugs.

H. G. WELLS

Drugs and the output of adrenaline. VII. Physostigmine. G. N. STEWART AND J.

ROGOFF. *J. Pharmacol.* 17, 227-48(1921); cf. *C. A.* 15, 122; 16, 1922.—Physostigmine, injected either intravenously or subcutaneously into cats, increased the output of adrenaline from the renal glands from 10 to 15 times. Immediately after the injection there was a transient diminution in output. After section of the splanchnic and other nerves going to the adrenals, there was no evidence that physostigmine caused this increased output of adrenaline.

C. J. WEST

Influences of colloids on the action of non-colloidal drugs. III, IV. W. STORM VAN LEEUWEN AND A. V. SZENT-GYÖRGYI. *J. Pharmacol.* 18, 257-69, 271-91(1921); cf. *C. A.* 15, 1945.—Further expts. are reported dealing with the substances in serum brain, etc., which are able to inhibit the action of certain alkaloids. The results seem to be so inconstant that it would seem unwise at present to found hypotheses upon them. One point, however, seems to have emerged more clearly. The absorption of pilocarpine by rabbit serum is inhibited by H_2O . This may be a phenomenon allied to the discovery by Dale that histamine is much more poisonous for the narcotized than for the normal cat. For suggested bearings of these expts. upon anaphylatoxin, the original papers should be consulted. V. A further analysis of the augmentor effect of lecithin on the action of pilocarpine. *Ibid* 20, 1-16(1922).—The action of pilocarpine can always or nearly always be augmented by the addn. of small amts. of cephalin or of an ultrafiltrate of cephalin emulsions; pure lecithin has no influence on pilocarpine action. Histamine action is mostly augmented by the addn. of pure lecithin; the influence of cephalin is positive but that of the ultrafiltrate is negative. Choline was not augmented by lecithin but sometimes by cephalin and the ultrafiltrate.

C. J. WEST

Rhododendron poisoning. S. W. HARDIKAR. *J. Pharmacol.* 20, 17-44(1922).—Andromedotoxin, the active principle of the rhododendron, acts upon the terminations of the vagus which it first stimulates and then paralyzes, and paralyzes the motor nerve ends in striped muscle. There is a narcotic effect upon the higher centers in the brain but the spinal cord is not affected. The seat of the emetic action has not been detd. At least a third of the poison injected hypodermically leaves the body unchanged in the urine.

C. J. WEST

Relation of histamine to intestinal intoxication. II. The absorption of histamine from the intestine. JONATHAN MEAKINS AND C. R. HARRINGTON. *J. Pharmacol.* 20, 45-84(1922); cf. *C. A.* 16, 2934.—The rate of absorption of histamine from the intestine, as measured by the rate of fall of blood pressure produced, is greatest from the ileum, somewhat less from the duodenum and very much less, though still perfectly definite, from the cecum and stomach. Absorption expts. with an Eck fistula in operation indicate that the liver exercises a protective function, probably more mech. than chem., against heavy doses of histamine. With the mucous membrane damaged by cutting off the blood supply for 5 to 15 min. the fall of blood pressure would indicate that absorption takes place at first with a rush and then almost ceases.

C. J. WEST

Evaluation of the hormone of the infundibulum of the pituitary gland in terms of histamine, with experiments on the action of repeated injections of the hormone on the blood pressure. J. J. ABEL AND C. A. ROUILLER. *J. Pharmacol.* 20, 65-84(1922).—Treatment of the paste of the posterior lobe with 14 g. $HgCl_2$ for each 100 g. lobe paste in 100 cc. of 0.35% HCl gave a ppt. (48.8 g.) which, when decompd. with H_2S , was found to contain all the pressor principle while the filtrate contains only depressor substance. Although contaminated with inert material the soln. of the pressor principle was as powerful in its action on the guinea pig uterus as at least 20 to 30 times its wt. of histamine phosphate. This soln. exhibits all of the really characteristic physiol. activities of ordinary saline exts. of infundibulum. It is believed that the vaso-motor, oxytocic and renal action of the prepn. are only the expression of the manifold physiol. properties of 1 and the same hormone.

C. J. WEST

Quantitative studies in chemotherapy. VI. Rate of excretion of arsenicals, a factor governing toxicity and parasiticide action. CARL VORGTLIN AND J. W. THOMPSON. *J. Pharmacol.* 20, 85-105(1922).—See C. A. 16, 3710. VII. Effect of ligation of the ureters or bile duct upon the toxicity and trypanocidal action of arsenicals. C. VORGTLIN, H. A. DYER AND D. W. MILLER. *Ibid* 129-51; cf. C. A. 15, 8335.—Ligation of both ureters increases toxicity and parasiticide action of those arsenicals which normally show a rapid rate of urinary excretion. The toxicity and parasiticide action of arsenicals with a low rate of urinary excretion in normal animals are not appreciably affected by ligation of the ureters. Complete obstruction of the bile duct increases the parasiticide action of arsphenamine and neoarsphenamine but not of atoxyl and produces only slight changes in the toxicity of neoarsphenamine. These facts show that the retention of the arsenicals by the tissues of the host is a necessary requisite for drugs of practical chemotherapeutic value. This retention must, however, be followed by such a chem. change (effected by the tissues), as ultimately to lead to the formation of As in a form which can be easily excreted.

C. J. WEST

Effect of adrenaline and extracts of pancreas and liver on blood dextrose. E. L. ROSS AND L. H. DAVIS. *J. Pharmacol.* 20, 121-8(1922).—The exptl. results agree with those of Langfeldt (C. A. 15, 1750) and lead to the conclusions that the pancreatic hormone reduces glucemia, specifically; that glycogenolysis is influenced by adrenaline and that the formation of glycogen is influenced by a pancreatic hormone. It is suggested that the mechanism of hyperglucemia differs from that suggested by L., in that the 2 substances react together and that the one in excess exerts its influence to either build or tear down glycogen.

C. J. WEST

Influence of arsphenamine and neoarsphenamine on the adrenaline content of the adrenal glands. BALDWIN LUCKE, J. A. KOLMER AND G. P. MCCOUCH. *J. Pharmacol.* 20, 153-62(1922).—The right adrenal glands of rabbits, injected with single doses of arsphenamine and neoarsphenamine in from 2 to 5 times the corresponding therapeutic amts., showed amts. of adrenaline almost identical with the av. value of control rabbits. When 2 to 12 "therapeutic doses" were used, the values were slightly less than those of control rabbits. The time of survival after injection did not appear to play any appreciable role. The lipoids appeared to be very slightly increased after a single injection and slightly decreased after multiple injections.

C. J. WEST

The so-called habituation to "arsenic" variation in the toxicity of arsenious oxide. ERICH W. SCHWARTZ. *J. Pharmacol.* 20, 181-203(1922).—See C. A. 16, 3710.

C. J. WEST

Edema of *p*-phenylenediamine. O. S. GIBBS. *J. Pharmacol.* 20, 221-31(1922).—*p*-C₆H₄(NH₂)₂ produces a typical edema of the head and neck, the initial stages of general edema. Atropine in doses sufficient to paralyze the parasympathetic nerves does not antagonize this action. The nervous system influences the edema production only indirectly by changing the blood supply. *p*-C₆H₄(NH₂)₂ has an action on the blood as is shown by the shortening of the clotting time. This edema is closely imitated by that induced by the perfusion of an animal with Ringer soln., showing that the action of the drug is a general one either on the blood vessels or the blood.

C. J. WEST

Poisonous tar dyestuffs (HUBER) 25.

I—ZOOLOGY

R. A. GORTNER

Causes of animal coloration. VIII. Variation of the amount of melanin in the color change of the fishes, *Esox*, *Carassius*, *Phoxinus*, and *Nemachilus*. T. KUDO. *Arch. Entwickl. Organ.* 50, 309-25(1922).—Press juice from the skin of these fishes darkens on exposure to air. An active tyrosinase which darkens tyrosine can be prepd.

from the skin. The dark pigment of fishes is a melanin originated by enzyme action. Melanin was prepd. from fish skin by heating the press juice to 90° and pptg. with acid. In this way it was shown that without exception dark skin gave a more abundant sepn. of melanin than light skin. The acquisition of a dark color by fishes is due not to the expansion of chromatophores but to the increase in the melanin concn. in the cells.

CHAS. H. RICHARDSON

The pupal color of the butterflies, *Vanessa*, *V. urticae*, *Pyrameis cardui*, and *P. atalanta*. L. BRECHER. *Arch. Entwickl. Organ.* 50, 209-308(1922).—The pupae of these butterflies, like *Pieris brassicae* (cf. C. A. 16, 3345) show 4 principal color types according to the surroundings in which they pupate. The darkest pupae originate on black surfaces, the lightest on white, gold pupae on surfaces which reflect yellow, medium-colored pupae on neutral surfaces or in darkness. The photochem. action of black surfaces depends upon the ultra-violet rays reflected from the black; the effect of white surfaces, on the infra-red rays. Infra-red rays restrict the formation of black pigment and further that of the white; red(?), orange, yellow and yellow-green prevent the production of black pigment and the white opacity, and permit the appearance of the gold luster; blue-green(?), blue, violet and ultra-violet further the formation of black pigment. Color adaptation depends upon the eyes. When the eyes are removed, this power is completely lost. When tyrosinase from various larval and pupal stages is added to tyrosine and the amt. of melanin pptd. observed, it is found that an increase of acidity occurs at the larval stage just prior to the beginning of pupation. The later suspended (pupating) larva shows a decrease in acidity corresponding to its decreased color sensitivity. Suspended larvae and pupae from yellow backgrounds gave a weaker tyrosinase test than those from black backgrounds. Other tyrosinase reactions are described.

CHAS. H. RICHARDSON

Enforcement and acceleration of amphibian metamorphosis by means of iodine. J. HIRSCHLER. *Arch. Entwickl. Organ.* 51, 482-503(1922).—The metamorphosis of the axolotl can be forced and that of *Rana esculenta* tadpoles can be significantly hastened by means of I. Transplantation of celloidin into the body cavity of *R. esculenta* tadpoles gave indications of metamorphosis which were due to mech. action. C. H. R.

The sclerites of the Octocorallan, *Briareum*, as biocrystals. W. J. SCHMIDT. *Arch. Entwickl. Organ.* 51, 503-51(1922).—Sclerites formed intercellularly of calcite. The shape of these sclerites is not detd. by the force of crystn. but by a peculiar effect produced by the organism. C. H. R.

Viscosity changes of the cell plasma during the first developmental stages of frog eggs. G. ÖNQVIST. *Arch. Entwickl. Organ.* 51, 610-24(1922).—Variations in the cell plasma of *Rana fusca* eggs were shown which were periodic in character. A certain time after fertilization there occurs a strong decrease in viscosity which cannot be produced by the absorption of water by the cell plasma. The results agree in principle with the work of Heilbrunn (C. A. 14, 3478; 16, 972). C. H. R.

Is the house-fly in its natural environment attracted to carbon dioxide? C. H. RICHARDSON AND E. H. RICHARDSON. *J. Econ. Entomol.* 15, 425-30(1922).—When CO₂ was passed through a layer of moist wheat bran exposed in the natural environment of the house-fly, *Musca domestica*, no oviposition occurred in the bran. Bran which volatilized the decompn. products of NH₄ carbonate (NH₄HCO₃, NH₄CO₂NH₂ mol. mixt.) in aq. soln., however, attracted the house-fly and induced oviposition. Since neither CO₂ nor H₂O in themselves induced egg-laying in the bran, it is believed that NH₃ was largely responsible for the attraction to the bran-NH₄ carbonate combination. Dil. solns. of NH₄OH were not nearly as effective as NH₄ carbonate solns. The reason for this was not ascertained, but several suggestions are offered. Cf. C. A. 12, 958; 16, 971.

C. H. R.

Experiments on the metamorphosis of neotenus amphibians. W. W. SWINGLE. *J. Exptl. Zool.* 36, 397-421(1922).—Adult *Necturus*, a perennibranchiate amphibian, may be fed, injected, and engrafted with physiologically active thyroid substance with only negative results. Such amphibians are permanent larvae that cannot be induced to metamorphose by thyroid treatment. The axolotl (larva of *Amblystoma tigrinum* which has failed to transform) readily metamorphoses when fed or injected with thyroid substance. The thyroid gland of *Necturus* possesses great physiol. activity as shown by its ability to hasten transformation of immature anuran larvae. The axolotl's thyroid is normal in appearance; failure to metamorphose is probably due to the inhibition or defective development of some factor which normally releases the thyroid hormone. This may be a defect of interrelation of the various components of the endocrine system. A similar explanation is given for large anuran larvae that have failed to metamorphose at the proper time. Expts. are cited which invalidate Uhlenhuth's claim that urodeles differ from anurans in that their metamorphosis is independent of I and influenced only by the thyroid hormone itself. See, however, Romeis, *C. A.* 17, 112. Also *C. A.* 13, 235, 877, 1093, 1605, 2070; 14, 193; 16, 971, 1466, 1623, 2181.

CHAS. H. RICHARDSON

Observations on qualitative chemical and physical stimulations in nudibranchiate molluscs with special reference to the role of the "rhinophores." H. P. KJERSCHOW AGERSBOG. *J. Exptl. Zool.* 36, 423-44(1922).—The "rhinophores" are not olfactory but react to acids alkalis and salts in soln. C. H. R.

A quantitative study of tarsal sensitivity to solutions of saccharose, in the red admiral butterfly, *Pyrameis atalanta* Linn. D. E. MINNICI. *J. Exptl. Zool.* 36, 445-57(1922); cf. *C. A.* 15, 2513; 16, 972.

CHAS. H. RICHARDSON

A micro injection study on the permeability of the starfish egg. R. CHAMBERS. *J. Gen. Physiol.* 5, 189-93(1922).—0.5 M solns. of NH_4Cl and NaHCO_3 satd. with CO_2 were injected into starfish eggs which had previously been stained with neutral red. The results showed that HCl and NaOH will permeate the protoplasm so long as no surface film acts as a barrier. But as long as the barrier exists they cannot enter. The semipermeability of the living cell appears to be a function of its surface film. Cf. Jacobs, *C. A.* 17, 406.

CHAS. H. RICHARDSON

Hydrolysis of higher fats in egg-secretion. OTTO GLASER. *Biol. Bull. Marine Biol. Lab.* 43, 68-74(1922).—Expts. proved that *Arbacia* egg-secretion has the power to hydrolyze higher fats. Since neither whale oil, olive oil nor cetyl butyrate occur in sea urchin eggs, the lipase present must be non-specific. The lipolysin isolated by Miss Woodward (cf. *C. A.* 13, 874) appears to be, or contain, that enzyme which in unmodified egg-water is responsible for the hydrolysis of the higher fats. I. W. R.

Effect upon developing eggs of extracts of embryos of the same species. MARY G. SPRINGER. *Biol. Bull. Marine Biol. Lab.* 43, 75-95(1922).—Exts. of *Arbacia* larvae in the 128-256 cell stage, in the early and in the late blastula, gastrula and pluteus stages, when present in sufficiently high concn. definitely retard the development of eggs of the same species. In low concns. the retardation may be within the limits of exptl. error. Besides retarding development these exts. often cause cytolysis, arrest of development and a noticeable failure of eggs to develop beyond the early non-motile blastula stage. I. W. RIGGS

Digestive activity of mesenchyme and its derivatives. VERA DANCHAKOFF AND S. M. SEIDLIN. *Biol. Bull. Marine Biol. Lab.* 43, 97-116(1922).—The introduction of a large amt. of edestin into the mesenchymal plate of the tail of the tadpole produces a local and a general reaction in the organism. The local reaction consists of a response of mobile and mobilizable cells and results in a dense infiltration of the injected mass. The injected suspension of edestin is a powerful chemotactic agent for both the granular

leucocytes and small lymphocytic cells. A general reaction appears in the blood-forming tissue of the kidney. It consists in intensive proliferative processes which seem to be in relation with the egress of small lymphocytes from this tissue. Two days after injection all of the edestin granules are found with the phagocytes. After 7 days the edestin had completely disappeared. L. W. RIGGS

Variations in hydrogen ions in the vicinity of eggs during division. FRED VIÉRS. *Compt. rend.* 175, 643-6(1922).—Sea urchin eggs in various stages of division were placed in sea water protected from the air by a layer of vasoline and contg. an appropriate indicator such as phenolphthalein ($\lambda=556$) or thymolsulfonephthalein ($\lambda=600$). By observing the liquid with a spectrophotometer it is possible to follow the relations between the development of the eggs and p_H concn. as shown by changes in the indicator. The method is a modification of that by Osterhout and Haas by which the sensibility is increased. L. W. RIGGS

12—FOODS

W. D. BIGELOW AND A. E. STEVENSON

Use of semi-microchemical methods in place of macrochemical methods in the analysis of foods. H. LUEHRIG. *Pharm. Zentralhalle* 63, 505-8(1922); cf. C. A. 16, 3978.—Estimation of water, fat and sodium chloride in butter and other edible fats. The sample, first homogenized by melting and stirring in a glass-stoppered capsule, is heated in about 1-g. portions in an Al or porcelain crucible (35 mm. high by 30 mm. diam.) intermittently over a small flame just to the point of the formation of a fine-blistery foam, an aromatic odor and a slight brown color. The entire heating requires not more than 1 min. It is cooled in a desiccator and weighed. The fat detn. is effected with the same sample; the residue is treated several times with a few cc. of Et_2O , the Et_2O passed through a small filter into a 50-cc. beaker, evapd., and the residual fat weighed. The NaCl residue is dissolved in warm H_2O , and titrated with standard $AgNO_3$ soln. W. O. E.

Milk of abnormal composition from various cows. L. T. SCHEY. *Tijdschr. Vergelijc. Geneeskunde* 8, 145-7(1922).—S. reports on cases of abnormal milk from normal cows, the cause of which is not known. The fat content is lower; the albumin and the sp. gr. are higher. The abnormality may disappear without special treatment. R. BEUTNER

What is to be considered as the fat percentage of milk? D. C. DE WAAL. *Tijdschr. Vergelijc. Geneeskunde* 8, 138-44(1922).—After discussing various methods for the detn. of fat in milk W. describes his own, which consists in adding NH_3 , alc., ether and gasoline. R. BEUTNER

The bacteriological aspects of cheese ripening. G. J. HUCKER. New York Agr. Exptl. Sta., *Tech. Bull.* No. 89, 36 pp.(1922).—A review with bibliography. K. D. J.

The types of bacteria found in commercial Cheddar cheese. G. J. HUCKER. New York Agr. Exptl. Sta., *Tech. Bull.* No. 90, 38 pp.(1922).—Of 39 samples of Cheddar cheeses, from approx. 25 factories, 12 were of an av. quality, 4 above av. and 23 below av. The grading was based upon the general flavor and palatability of the sample. From these samples, 265 organisms were isolated and studied, the majority of which came from cheeses of relatively poor quality. In the order of their frequency of occurrence, the organisms were grouped as follows: (a) spore formers, (b) Gram-negative rods, (c) lactobacilli, (d) *Streptococcus lactis*, (e) cocci, (f) streptococci other than *S. lactis*, and (g) yeasts. The flora of the poorer grades was composed largely of (a) and (b), and that of the better samples of (c) and particularly (d). Cocci and streptococci, other than *S. lactis*, varied very little in numbers in the different qualities of cheese. Fecal material,

dust, etc., are regarded as being the sources of (a) and (b) in the poorer grades. The milk should be handled so as to prevent the introduction of these types. Of the organisms isolated from the poorer grades of cheese, 50% liquefied gelatin, and of those (34%) from the better grades, the majority were cocci. The action of the isolated organisms on milk and sugars is indicated. There is need for a more reliable and rapid test to discriminate between milks contg. desirable and undesirable bacteria. K. D. J.

Bleaching processes [for flour]. A. R. SASSER. *J. Am. Assoc. Cereal Chem.* 7, 181-5(1922).—A brief review. The Novadel process. C. T. STORK. *Ibid* 185-6.—Discussion [on flour bleaching]. *Ibid* 187-208. E. J. C.

Changes which occur in the pectic constituents of stored fruit. M. H. CARRÉ. *Biochem. J.* 16, 704-712(1922); cf. *C. A.* 16, 1994.—In the early stages of the maturation of the apple there is no sol. pectin, but it gradually develops as ripening proceeds till it attains a max. amt. when the fruit reaches its fully ripe condition. The curves showing the development of pectin in cold and ordinary stored fruit are very similar; the only effect of the low temp. is to prolong the period of ripening. A method is described for the estn. of *protopectin*, the insol. pectin constituent, which depends on heating the residue after extn. of the sol. pectin in an autoclave with 0.05 N HCl, thereby converting the insol. into the sol. form, which is then pptd. as the Ca salt. After the max. sol. pectin content is passed the quantity of sol. pectin tends to decrease, and the decrease is roughly proportional to a simultaneous increase in the insol. pectin. On the other hand, both the protopectin and sol. pectin decrease markedly in soft over-ripe fruit as compared with harder less ripe fruit. B. H.

"Reconstructed" pasteurized milk. J. M. COLONY. U. S. 1,434,094, Oct. 31. Skim milk powder is dissolved in H₂O and mixed with sufficient butter to produce a rich cream. The mixt. is heated to a pasteurizing temp. and homogeneously emulsified and afterward dild. with a pasteurized skim milk soln. to obtain a compn. approximating fresh milk.

Emulsifying milk with fats. G. GRINDROP. U. S. 1,435,464, Nov. 14. Coconut fat or a similar fat is treated with steam under pressure to subdivide the fat into globules and these globules together with steam are then introduced into skim milk to heat the latter and form a film upon the fat globules.

Apparatus for heating and cooling milk. S. P. HAY. U. S. 1,435,295, Nov. 14.

Butter substitute. C. and H. H. DOERING. U. S. 1,434,048, Oct. 31. Milk is heated to cause thickening, allowed to cool and subsequently heated to a higher temp. The whey is then sepd. and there is added to the curd about 3% its amt. of previously heated and salted vegetable oils or animal fats, e. g., coconut oil or peanut oil and the mixt. is worked mechanically to effect a thorough blending.

Butter substitute. C. and H. H. DOERING. U. S. 1,434,049, Oct. 31. A vegetable oil, e. g., coconut oil or peanut oil, is emulsified with milk, the emulsion is pressed through a chilling hrine to form crystals of oil or fat, these crystals are removed from the hrine and are divided into small vermicular portions to express excess moisture and are then compressed to encase adhering moisture and a small amt. of air.

Coffee substitute. K. LENDRICH. U. S. 1,434,297, Oct. 31. Cereals mixed with malt are treated with a soln. of caffeine and CaCl₂ and agitated with steam under pressure to effect roasting and modification of starch, albumin, and other constituents.

13—GENERAL INDUSTRIAL CHEMISTRY

HARLAN S. MINER

- The chemical industry. Its relation to national defense. J. M. WAINWRIGHT. *Army Ordnance* 3, 140-2(1922). E. J. C.
- Shaping management to meet developing industrial conditions. H. S. PERSON. *Chem. Met. Eng.* 27, 1165-9(1922). E. J. C.
- Practice and theory in an industrial problem. F. F. ARMSTRONG. *Chem. News* 125, 229-31(1922). E. J. C.
- South African chemical industry and its future. GEO. H. STANLEY. *Chem. News* 125, 337-43(1922).—An address. E. J. C.
- Commercial developments in the organic chemical industry, 1922. E. H. KILLEFFER. *Ind. Eng. Chem.* 15, 21-2(1923). E. J. C.
- Physical chemistry in industry. R. S. TOUR. *Ind. Eng. Chem.* 15, 5-6(1923). E. J. C.
- Heavy chemicals in commerce in 1922. D. H. KILLEFFER. *Ind. Eng. Chem.* 15, 20-1(1923). E. J. C.
- Fine chemicals and national prosperity. WM. J. POPE. *Chem. Age* (London) 7, 674-5(1922). E. J. C.
- Cost accounting in chemical laboratories. F. W. FEUERBACHER. *Chem. Age* (N. Y.) 30, 497(1922). E. J. C.
- Current chemical patents and patent problems. I. VAN DOREN. *Chem. Age* (N. Y.) 30, 513-8(1922); cf. *C. A.* 16, 2373. E. J. C.
- Patent laws of interest to chemists. I. Patent rights. F. E. BARROWS. *Ind. Eng. Chem.* 15, 80-1(1923). E. J. C.
- Inventions, inventors, patents. WM. H. PARRY. *Metal Ind.* 20, 465-6(1922). E. J. C.
- Important additions to and changes in the Czecho-Slovakian patent law. E. HÜTNER. *Chem.-Ztg.* 46, 1017(1922). E. J. C.
- Wooden barrels for chemicals. ANON. *Chem. Met. Eng.* 27, 1231(1922). E. J. C.
- Heat transfer by conduction and convection. II. Liquids flowing through pipes. Correction. W. H. MCADAMS AND T. H. FROST. *Ind. Eng. Chem.* 15, 99(1923); cf. *C. A.* 17, 318. E. J. C.
- Modern refrigeration plants. KONSTANTIN REDZICH. *Wärme & Kälte Tech.* 24, 154-6, 162-4, 178-80, 190-1(1922).—A miscellany. R. describes some small refrigeration plants for restaurants, etc.; coolers for milk after pasteurizing; cooled presses for soap; the Linde process for O₂ and N₂; the recovery of CO₂ from breweries; high-pressure multistage compressors. The diagnosing of troubles in a refrigeration plant is also considered. ERNEST W. THIELE
- Comparison of paraffin and asphalt lubricating oils (WILLIAMS) 22. Thermometric lag with special reference to cold-storage practice (GRIFFITHS, AWBERG) 2. Mechanical appliances for pumping chemical solutions (FISCHER) 1. Asbestos products as dielectrics (FLIGHT) 4.
- Mixing substances of different fluidity or inertia. C. F. SHERWOOD. U. S. 1,434,232, Oct. 31. Particles such as oil and mineral pulp (for flotation) or similar materials to be mixed are projected against a resilient material such as rubber to facilitate their mixture.
- Electric resistance unit. W. P. BOVARN. U. S. 1,433,932, Oct. 31. Structural features.

15—SOILS, FERTILIZERS AND AGRICULTURAL POISONS

J. J. SKINNER

Nitrogen economy in soils. F. E. BEAR. *J. Am. Soc. Agron.* **14**, 136-52(1922).—A general discussion. Temp., rainfall, soil reaction, the cropping system, fertilizer treatment and soil texture are some of the factors which cause the point of equilibrium between N income and outgo in soils to vary.

F. M. SCHERTZ

The effect of nitrates applied at different stages of growth on the yield, composition and quality of wheat. JERUEL DAVIDSON. *J. Am. Soc. Agron.* **14**, 118-22(1922).—The effectiveness of nitrates in increasing yields consistently decreases as the time of their application approaches the stage of heading. The effectiveness of nitrates in increasing the protein content ($N \times 5.7$) of the grain increases as their effectiveness in increasing the yield decreases.

F. M. SCHERTZ

Intertillage of crops and formation of nitrates in soil. T. L. LYON. *J. Am. Soc. Agron.* **14**, 97-109(1922).—Two years' expts. on a silty clay loam soil at Ithaca, N. Y., are recorded on the effect of cultivating, scraping and mulching with straw, on the nitrate content of unplanted soil and on the yields of corn. Nitrates were highest in the cultivated plots, next in the scraped and lowest in the mulched. The higher nitrate content of the cultivated plots was not due to moisture. Yields of corn were greater on the mulched than on the scraped although the nitrates were much lower on the mulched plots. The evidence presented here favors the assumption that the nitrate content of the cultivated plots is higher than that of the scraped plots because of the aeration produced by stirring with the cultivators.

F. M. SCHERTZ

Disappearance of nitrates from soil under timothy. J. A. BIZZELL. *J. Am. Soc. Agron.* **14**, 320-26(1922).—The addition of $NaNO_3$ to timothy sod in early spring is followed by a rapid disappearance of the nitrate from the 8 in. of surface soil; this disappearance is due only in part to the absorption of N by the growing crop. Leaching or denitrification apparently did not remove the N from the soil. Various organisms of the soil evidently transformed the nitrate into NH_4 or into some form of org. combination.

F. M. SCHERTZ

Studies on the effect of nitrogen applied to oats at different periods of growth. W. F. GERRICK. *J. Am. Soc. Agron.* **14**, 312-20(1922).—The paper records the effect of N applied to oats at different periods of growth on time of maturation of the plants, on the number and height of stalks produced, on production of dry matter and on the protein content of the grain.

F. M. SCHERTZ

The absorption of water by soil colloids. W. O. ROBINSON. *J. Phys. Chem.* **26**, 647-53(1922).—The absorption of H_2O vapor by soil colloids was detd. by placing a 2-g. sample of air-dry colloid in a flat glass-stoppered weighing bottle which was kept open in a vacuum desiccator over 2% H_2SO_4 . The air was evacuated to less than 50 mm. of Hg and the desiccator kept in a thermostat at 30° for 5 days. The sample was then weighed, dried at 110° and again weighed to obtain dry wt. Samples of the colloidal matter extd. from 34 soils which differed widely in texture, origin, mode of formation and chem. compn. showed a relatively const. absorption of H_2O vapor. The extreme values for absorption were 0.240 g. and 0.348 g. H_2O per g. of colloid and the mean value was 0.298. The colloidal matter in a soil might be fairly closely estd. by detg. under certain conditions the H_2O absorption of the soil and dividing the result by the av. factor 0.298.

M. S. ANDERSON

The influence of irrigation water on the composition of the soils. J. E. GREAVES. *J. Am. Soc. Agron.* **14**, 207-12(1922).—The intelligent use of irrigation water requires knowledge of the chem., phys. and biol. properties of the soil, together with a knowledge

of the compn. of the water and its influence upon the chem., phys. and biol. changes going on in the soil.

F. M. SCHERTZ

A new muck soil problem and its solution. M. E. SHERWIN, R. B. EPPERIDGE AND A. DUNHAM. *J. Am. Soc. Agron.* 14, 212-15(1922).—A discussion of a muck soil in North Carolina

F. M. SCHERTZ

The relation of the reaction and of salt content of the medium to nitrifying bacteria. C. S. MEEK AND C. B. LIPMAN. *J. Gen. Physiol.* 5, 195-204(1922).—Crude cultures of nitrifying bacteria were grown upon media consisting of K_2HPO_4 1 g., $NaCl$ 1 g., $MgSO_4$ 0.5 g., $FeCl_3$ 1 drop of a 10% soln., H_2O 1000 cc. To this was added, as needed, 1 g. $(NH_4)_2SO_4$ for nitrite formation cultures and 1 g. $NaNO_3$ for nitrate cultures. The cultures were adjusted to a wide range of p_H by the addn. of $NaOH$ and H_3PO_4 . The nitrite- and nitrate-forming organisms from garden soil withstood extremely high OH^- concns. (p_H 13.1). Organisms from peat soil withstood a somewhat lower concn. (p_H 9.5). They rapidly modified the media towards a lower p_H . At the lower OH^- concn. there was little change in p_H from the initial value to that observed in the soln. when nitrite formation was observed. This was not so true of nitrate formation. Organisms from garden soil stop the production of nitrites and nitrates at p_H below 5.4; however, organisms from peat soil actively produce nitrites at 4.1 and probably lower. These peat-soil organisms are less resistant to OH^- and more resistant to H^+ than the other organisms tested. Nitrate formers are probably slightly more resistant to alkali than nitrite formers. p_H 10.0 is the optimum point for the speedy oxidation of NO_2^- to NO_3^- . The toxicities of $NaCl$ and Na_2CO_3 to nitrifying bacteria are about equal; Na_2SO_4 is not nearly so toxic.

CHAS. H. RICHARDSON

Agricultural and commercial values of nitrogenous plant foods. A. W. BLAIR. *J. Am. Soc. Agron.* 14, 162-67(1922).—N in the form of org. materials has cost the farmer more than inorganic forms and has not given greater returns. The crops' ability to use the readily available nitrate early in its growth and thus get an early and vigorous start has much to do with the larger yields where nitrate was used. The commercial values of organic nitrogenous materials should be made more in keeping with their agricultural values.

F. M. SCHERTZ

A study of present and future supplies of fertilizer nitrogen. S. B. HASKELL. *J. Am. Soc. Agron.* 14, 167-78(1922).—A general survey. The enormous waste of our resources is pointed out.

F. M. SCHERTZ

Soil acidity and lime fertilization. KAPPEN. *Mitt. deut. Landw.-ges.* 37, 660-3 (1922).—A general discussion of the type and cause of soil acidity. Soil acidity due to the use of fertilizer salts is discussed in detail, and also the use of lime as a remedy for this condition.

K. D. JACOB

Experiments with different nitrogen fertilizers. O. NOLTE. *Mitt. deut. Landw.-ges.* 37, 540-2(1922).—A large number of plot expts. were carried out with grains and potatoes to det. the relative value of different forms of N applied in equiv. amts. Based on the yield of grain, the av. effectiveness of the N compds. used is in the following order: with rye, $(NH_4)_2SO_4$, NH_4 sulfate-nitrate, $NaNO_3$, NH_4Cl ; with wheat, NH_4 sulfate-nitrate, $NaNO_3$, $(NH_4)_2SO_4$, NH_4Cl ; with oats, NH_4 sulfate-nitrate, NH_4Cl , $NaNO_3$. The variations in yield were, however, small with potatoes; NH_4 sulfate-nitrate gave decidedly better results than did $NaNO_3$.

K. D. JACOB

Rhenania phosphate. A. MESSERSCHMITT. *Z. angew. Chem.* 35, 537-43(1922).—Rhenania or Vesta phosphate is prepd. by sintering together, in a rotary or shaft furnace at a temp. of 1200-1300°, an intimate mixt. of raw phosphate, limestone and alkali silicate or alkali-Al silicate such as phonolite, feldspar or leucite. To the resulting alkali-Ca phosphate M. ascribes the formula $Ca_2KNa(PO_3)_2$. The process possesses the advantage that low-grade raw phosphates, rich in Fe and Al, can be utilized. The

compn. of the product is dependent upon the nature of the raw phosphate and alkali silicate used. In general it contains: P_2O_5 , 15 to 25% of which about 10% is sol. in H_2O , 75% in H_2CO_3 soln., and 80 to 90% in 2% citric acid soln.; K_2O and Na_2O , 8 to 15%; SiO_2 , 10 to 20%; CaO , 35 to 40%; and Al_2O_3 , FeO , MgO , etc. (chiefly Al_2O_3). With leucite as a source of alkali silicate, a product contg. 8% K_2O can be obtained. Lime has no effect upon the availability of the P_2O_5 in Rhenania phosphate. The results of a large number of expts. comparing Rhenania phosphate with Thomas meal, superphosphate and bone meal on different crops show that this material is equal or superior in action to the others. The development of the Rhenania phosphate industry in Germany is briefly described.

K. D. JACOB

The effect of fertilizers on the germination and bacterial development of inoculated soy-bean seed. T. B. HUTCHESON AND T. K. WOLFE. *J. Am. Soc. Agron.* 14, 284-86 (1922).—Fertilizers when applied to a sandy loam soil in direct contact with soy-bean seed did not have any appreciable detrimental effect on the germination of the seed or on the development of nodules on the roots of the plants.

F. M. SCHERTZ

The potassium-nitrogen ratio of red clover as influenced by potassic fertilizers. PAUL EMERSON AND JOHN BARTON. *J. Am. Soc. Agron.* 14, 182-92 (1922).—Pot culture tests were made on red clover with various forms of fertilizers on Miami silt loam soil. The amt. of K taken up varies with the treatment applied. The soly. of soil K, as indicated by absorption by the plant, is increased by applications of manure, acid phosphate or combinations of both. The ability of red clover to take up K varies with the kind of compd. supplied. K of kainite is more easily absorbed than either KCl or K_2SO_4 . Lime in the form of $CaCO_3$ applied to an acid soil apparently has no effect on the soly. of native soil K, but may possibly overstimulate nitrate production. The K-N ratio is widened slightly by applications of lime, but narrowed by applications of manure or acid phosphate or both in the presence of lime.

F. M. SCHERTZ

Control of cotton wilt by the use of potash fertilizers. L. E. RAST. *J. Am. Soc. Agron.* 14, 222-4 (1922).—Cotton wilt was evidently controlled at Scott, Arkansas by the use of potash in the fertilizer.

F. M. SCHERTZ

Arsenical spray experiments for controlling codling-moth in pears at Elsenburg. F. W. PERRY. *J. Dept. Agr. Union S. Africa* 5, 360-3 (1922).—Trees sprayed with calcium arsenate produced from 10 to 30% more wormy fruit than those sprayed with lead arsenate. Lime-sulfur and Bordeaux mixt. reduced the efficiency of lead arsenate only 1 to 5%. Calcium caseinate used in conjunction with lead arsenate gave a material that spread well but the efficiency of the poison was not increased.

K. D. JACOB

The chemotherapy of the barley rust. A. BINZ AND H. BAUSCH. *Z. angew. Chem.* 35, 241-3 (1922).—The toxic action of a no. of germicidal substances upon barley embryos and their destructive effect upon spores of the barley rust were quant. detd. The *chemotherapeutic index* of Ehrlich, c/t , where c = curative dose and t = toxic dose, is for the various substances as follows: atoxyl > 1 ; arspenamine > 1 ; neoarsphenamine > 1 ; As_2O_3 1; $3,4-H_2N(HO)C_6H_4AsO$ 1; substance A $1/1.5$; $4-H_2NC_2H_4AsO$ $1/2$; Uspulun $1/4$; formalin $1/8$; substance B $1/8$; substance C $1/10$. Uspulun is a proprietary prep.; substances A, B, and C are antiseptics developed by the authors and their compn. is being temporarily withheld. The applicability of Ehrlich's index to chemotherapeutic studies on plants is demonstrated. Cf. C. A. 16, 3522.

W. A. PERLZWRIG

Metallic mercury as an insecticide. A. O. LARSON. *J. Econ. Entomol.* 15, 391-5 (1922).—Hg prevents the development of the eggs of the bean weevil, *Bruchus quadrimaculatus*, when placed in closed containers with infested beans. It is also suggested that Hg will prevent the hatching of the eggs of the clothes moth.

C. H. R.

Resistance of certain scale insects in certain localities to hydrocyanic acid fumiga-

tion. H. J. QUAYLE. *J. Econ. Entomol.* 15, 400-4(1922).—The citrus red scale, *Chrysomphalus aurantii*, is more resistant to HCN in certain localities than in others. The same is true of the black scale. The cause is not known. The scales which survive 1 fumigation are apparently more resistant to the next. The greatest resistance is shown by scales on trees that have been subjected to regular yearly fumigations.

CHAS. H. RICHARDSON

Nicotine delivery from dust carriers. W. RUDOLFS. *J. Econ. Entomol.* 15, 421-4 (1922).—"Nicotine derived from nicotine sulfate is evolved less rapidly from a colloidal than from a crystalloidal carrier; is evolved most readily when a large % of carbonates (Ca and Mg) is present; is evolved more readily under influence of high temp. and high atm. moisture conditions. Nicotine derived from high strength (95%) "free" nicotine soln. is evolved more readily from a crystalloidal than from a colloidal carrier; is evolved from dolomite, hydrated lime, etc., at approx. the same rate; is evolved more rapidly under high temp. and low atm. conditions than from free nicotine in the sulfate form." Mg limestone impregnated with nicotine forms a good dust for ground crops. For orchard dusting, hydrated lime + nicotine or hydrated lime + 10% dolomite + nicotine sulfate is recommended.

CHAS. H. RICHARDSON

Phosphatic fertilizer. H. PLAUSEN. U. S. 1,434,749, Nov. 7. Insol. phosphate material such as Thomas phosphate meal is subjected to thorough mechanical disintegration together with humic acid-contg. material, e. g., bituminous brown coal and caustic alkali.

Vacuum drum drier for preparing fertilizer from tankage or similar materials. P. J. HAMLER. U. S. 1,434,613, Nov. 7.

Lime sulfur. R. TAKI. U. S. 1,434,266, Oct. 31. CaO with an excess of S and H₂O are mixed in a revolving horizontal autoclave and heated to above the m. p. of S by introduction of steam under 25 lbs. pressure per sq. in. After the reaction, the materials are allowed to cool to effect sepn. of the excess S as a deposit on the bottom of the autoclave.

17—PHARMACEUTICAL CHEMISTRY

W. O. EMERY

The camphor therapy per os. Camphochol, a new camphor preparation. E. W. TASCHENBERG. *Deut. med. Wochschr.* 47, 1524-5(1921).—Camphochol is an addition compd. of purest Japan camphor and apocholic acid. The prepn. contains 28% camphor, forms colorless crystals, m. 178-180°. It is insol. in water, easily sol. in weakly alk. solns.

S. AMBERG

A new antineuralgic "Veramon." E. A. MARTIN. *Deut. med. Wochschr.* 47, 1586(1921).—Veramon is a combination of 2 mols. dimethylaminophenyldimethylpyrazolone with 1 mol. diethylbarbituric acid. It is recommended against pain.

S. AMBERG

Aluminium oleate. V. VIECHOVSKI. *Münch. med. Wochschr.* 68, 1082(1921).—To a soln. of Na oleate an Al₂(SO₄)₃ soln. is added, whereupon Al oleate is pptd. Since the sulfate is strongly acid the ppt. always contains free oleic acid, which makes the ppt. sticky and smeary. The free oleic acid is removed by kneading the ppt. with alc. The oleate is then dissolved in ether. Before evapn., a certain amt. of liquid paraffin is added, then the ether is distd. off and the little remaining alc. removed on the water bath. The product is a transparent light amber-colored gelatinous mass of rubber-like consistency. This consistency is due to the presence of a remnant of free acid. Addition of a small amt. of a weak base such as alkaloids or antipyrine removes the gelatinous

character; or it can be avoided by shaking the ethereal oleate with CaO before evapn. Al oleate is now made commercially under the name of "Olminal"; it contains about 1.5% Al. The solvent is no longer liquid paraffin but pure olive oil. A powder is easily prepd. by dissolving Al oleate in water, adding starch and pptg. with $Al_2(SO_4)_3$. The Al soap ppts. in very fine division on the starch. The ppt. is powdery and can be washed free from $Al_2(SO_4)_3$ with water and of oleic acid with alc. S. AMBERG

Is it possible to replace the foreign drugs, senega and ipecacuanha, by domestic plants? C. GRIMME. *Münch. med. Wochschr.* 69, 50-1(1922).—Senega, the active principle of which is saponin, can be replaced by radix primulae, and ipecacuanha, which contains as the active principle emetine, by the root of violets. S. AMBERG

Gynergen, a new drug to alleviate atonia of the uterus. K. BÖWING. *Münch. med. Wochschr.* 69, 266-8(1922).—Gynergen is ergotamine tartrate. It proved of value in cases of atonic uterus. S. AMBERG

The treatment of syphilis with bismuth. H. MÜLLER. *Münch. med. Wochschr.* 69, 547-9(1922).—*Trepol* is a K Na Bi tartrate which proved very useful in certain cases of syphilis. S. AMBERG

Apochin. W. MAY. *Münch. med. Wochschr.* 69, 745(1922).—Apochin contains 51.6% acetylsalicylic acid and 48.4% quinine. It is recommended as a good antineuralgic. S. AMBERG

Liquitalis. A new cardiac remedy. P. CLASSMAN. *Münch. med. Wochschr.* 69, 1084(1922).—Liquitalis is obtained by extn. of digitalis leaves with cold water; it contains the gitalin complex and digitalin, but no digitoxin or digitonin. It has been used successfully. S. AMBERG

Year's work of U. S. chemists in odors, flavors, food, soap materials and other fields. W. G. CAMPBELL. *Am. Perfumer* 17, 437-50(1922). E. J. C.

Progress in the field of essential oils and the chemistry of the terpenes in 1921. K. BOURNOT. *Chem.-Ztg.* 46, 1041-2, 1065-7, 1086-7, 1089-91(1922).—A review with literature references. E. J. C.

Medicinal chemicals in 1922. J. F. QUEBENY. *Ind. Eng. Chem.* 15, 23-4(1923). E. J. C.

Constituents of essential oils. L. G. RADCLIFFE. *Proc. Roy. Soc. Arts* 70, 811-16, 825-41, 843-54(1922).—See C. A. 16, 2574. E. J. C.

New remedies. J. MESSNER. *Z. angew. Chem.* 35, 629-31, 633-9(1922).—A review with numerous literature references. E. J. C.

Some specimens of cultivated digitalis. CARMEN CIPPINI. *Giorn. farm. chim.* 71, 169-76(1922).—Digitalis cultivated in the regions of Corlaga and Bagnone during the years 1915-21 has practically the same physiol. activity as the wild digitalis of commerce. A. W. DOX

Development of the preparation of drugs during the past hundred years. P. VAN DER WIELEN. *Pharm. Weekblad* 59, 1326-47(1922). A. W. DOX

Sirup of manganous iodide. R. GUYOT. *Bull. soc. pharm. Bordeaux* No. 3-4 (1921); *Répert. pharm.* 34, 321-2(1922).—To prep. sirup of MnI_2 , introduce 2 g. of finely powd. Mn and 10 cc. of orange flower water into a suitable flask and add 4.10 g. of I in small portions, keeping the temp. of the mixt. down by cooling under the faucet. When all of the I has been added and the reaction is completed, cool the mixt. and filter it rapidly into 990 g. of sirup to which has been added 1 g. of tartaric acid. A. G. DU Mez

Identification of benzophenol, salol, betol, cresolol and salophen by microchemical means. G. DENIGES. *Bull. soc. pharm. Bordeaux* 60, 163-9(1922).—Benzophenol (β -naphthyl benzate).—Place a fraction of a mg. of the powd. material on a glass slide, cover with a drop of $CHCl_3$ dropped from a tapered glass rod, the diam. of the small

end of which is 2 to 4 min. The material dissolves readily and, on evapn. of the CHCl_3 , is deposited in crystal groups which form zones more or less concentric. (See illustration in the original.) Allow the CHCl_3 to evap. completely, then place a droplet of glacial AcOH in the center of the residue. If this solvent is permitted to evap. spontaneously, the material is deposited in beautiful arborisations often accompanied by small isolated or crossed prisms. If the CHCl_3 or AcOH residue is mixed with a droplet of concd. H_2SO_4 and a glass rod which has been dipped into HCHO soln. inserted in the center of this mixt., a yellow-brown color will develop. On heating gently, the mixt. blackens. *Salol* (phenyl salicylate).—Under the same treatment as described above salol is deposited by the CHCl_3 in the form of an oily droplet, which is not changed by treatment with AcOH. If a droplet of EtOH is added to the CHCl_3 or AcOH residue and allowed to evap., groups of rhombic plates will form. The same can be obtained by seeding the CHCl_3 or AcOH residues with a few small crystals of the original material. On treating the CHCl_3 or AcOH residues with H_2SO_4 and HCHO, a white cloudiness develops followed by a red coloration which is heightened by heating. *Betol* (β -naphthyl salicylate), treated with CHCl_3 as above, is deposited in the form of an oily droplet. On further treatment with AcOH, it is deposited in isolated rhombic plates mixed with clusters of prisms. Treatment of the CHCl_3 or AcOH residues with H_2SO_4 and HCHO gives the same results as benzonaphthol. *Cresalol* (*p*-cresyl salicylate). Because of the low m. p. of this ester (36°), it is impossible to obtain crystals with CHCl_3 , AcOH, EtOH, acetone or pyridine. In this case recourse must be had to seeding the oily droplet deposited by the solvent. On treatment with H_2SO_4 and HCHO, cresalol acts like salol. *Salophen* (*p*-acetaminophenyl salicylate).—Treated with acetone instead of CHCl_3 as above, this material is deposited as numerous isolated or more often tangled rhombic plates. Treated with H_2SO_4 and HCHO, a rose tint develops in the cold. On heating the color is accentuated at first, then changes to brown.

A. G. DUMÉZ

Jottings from a pharmaceutical laboratory note book. GEORGE F. ÉWE. *Pract. Drug* 40, No. 12, 22–23 (1922).—*Wax-coated bichloride tablets*.— HgCl_2 tablets coated with candelilla wax and paraffin to prevent accidental poisoning are unsatisfactory because the tablet, even when broken in 4 pieces, dissolves very slowly and the soln. formed contains particles of wax, which necessitates straining or filtering. *Color of ointment of red oxide of mercury, N. F.*—This ointment when made in modern ointment milling machines is yellowish in color instead of red because of the high state of sub-division of the oxide. This in no way detracts from its value. In fact the minute subdivision of the oxide is desirable, especially where the ointment is intended for application to the mucous membranes. *Proportion of acetic acid required for the preservation of acetic fluidextracts*.—Acetic fluidexts. of larkspur, sanguinaria and squill require between 7 and 8 g. of absolute AcOH per 100 cc. for preservation, although fluidextract of sanguinaria has kept well with as little as 4.06 g. *Variation of tinctorial power of sanguinarine nitrate*.—The cause for the variation in coloring power of this material is thought to be due to contamination with varying amts. of the "purple substance" which is a normal constituent of sanguinaria. *Effect of heating on Carrel-Dakin solution*.—Before heating, the free Cl (calcd. as NaOCl) in 3 samples was 0.0429, 0.0605 and 0.0705%, resp. After heating to 70° and keeping in a "caloris" bottle for 12 hrs., it was 0.105, 0.109 and 0.145%. *A preparation affording nascent AgI*.—A mixt. of 72.3 grains of powd. AgNO_3 with 310 grains of KI and sufficient distd. H_2O to make 1 fl. oz. This concd. product is diluted 20 to 1000 times depending on the use for which it is intended. *Department of SrCO_3 upon ignition*.— SrCO_3 (pptd.) can be ignited with the filter paper on which it is collected without the formation of oxide providing an ordinary "blast Bunsen burner" which is not equipped with artificial air pressure is used. Exptl. ignitions show the same

weight before and after treatment with $(\text{NH}_4)_2\text{CO}_3$. *Stabilization of oil volatile ingredients in compressed tablets.*—Cresote, guaiacol and phenol, because of their acidic or phenolic character, can be fixed by combining them with MgO or CaO. The combination effected by means of heat and moisture is rather loose. Oils of cubeb, copaiba, eucalyptol and sandalwood are adsorbed on MgCO_3 . *Hazards of the manufacture of emetine salts.*—Workers engaged in the mfg. of emetine salts frequently suffer from boil-like eruptions due to the irritant action of the alkaloid. These eruptions usually occur at the entrance of the nasal passages, the wrists and neck. They yield to treatment with the common antiseptic healing ointments.

A. G. DuMéz

Detection of nitro compounds. H. J. PRINS. *Perfumery Essent. Oil Record* 13, 355(1922).—The fact that PhNO_2 has a very marked accelerating effect on the reaction velocity of metals with weak acids may be used for the detection of PhNO_2 in BzH, and for artificial musk in perfumes. While not exclusively specific for nitro compounds (org. peroxides have the same property but in less degree), such cases can hardly give rise to confusion, since the presence of peroxides is readily shown by the power to liberate I from a mixt. of KI and a dil. acid. Heat 2 cc. of the sample in about 6 cc. 80% AcOH in a test-tube for about 1 min. in the presence of a small piece (about 25 sq. mm.) of tin foil. If 5% or more of PhNO_2 is present the Sn rapidly dissolves, leaving only black impurities. Less than this amt. turns the Sn black, the metal partially or wholly dissolving if allowed to stand some time at room temp. Thus, with 5% or more PhNO_2 , the Sn disappears almost immediately on boiling. With 1% the metal turns dark and disappears after about 10 min. on heating. With 0.1% the Sn turns black after 10 min.; while with 0.01% the metal becomes gray-black overnight.

W. O. E.

Note on the detection of nitrobenzene. J. E. PICKERING. *Chem. Trade J.* 70, 144 (1922).—Dissolve 1 or 2 drops of the nitro compd. in 5 cc. of EtOH and then add 5 drops of 1% aq. NaOH. In the presence of nitrobenzene a pink to red color develops, the intensity varying with the amt. of nitrobenzene. After a few min. the color gradually fades to dull yellow. Aniline and *o*- and *p*-nitrotoluene do not give this color reaction; the latter 2 compds. have no effect on it but aniline prevents it. An explanation of the chem. reactions involved is offered.

E. J. C.

Detection of nitrobenzene. A. RECLAIRE. *Perfumery Essent. Oil Record* 13, 356(1922).—The opinions of Pickering (cf. preceding abstr.) and of V. Meyer and Stadler (*Ber.* 17, 2, 780) on the detection of PhNO_2 are confirmed. Pure and com. PhNO_2 do not give the red coloration due to the presence of dinitrothiophene. Amts. of PhNO_2 under 10% are easily detected by the odor after shaking with NaHSO_3 soln.

W. O. E.

Ash determination of drug plants. ALFRED AHLBQVIST. *Svensk. Farm. Tids.* 26, 437-46(1922).—Ash detns. on 41 Swedish plants representing 14 species were made. The official method was modified as to ignition as follows: The sample weighed into a Pt crucible was placed in as nearly a horizontal position as possible on a quartz triangle. The cover, with its concave side down, was placed in such a position that its edge extended into the crucible at a point corresponding to the center of the rim of the crucible opening. A very small Bunsen flame was placed just under the center of the crucible cover. A diagram of this arrangement is given. The flame is increased when the material ceases to smoke until smoke begins again. When a slight increase in the flame no longer causes smoke the flame is moved to a position centrally under the sample and the ashing completed. For the most part the duplicates are in very close agreement. In some 15 instances there are differences in excess of 0.1%. The following is a summary of the analyses: arnica, 6.1-6.5; chamomile, 9.9-13.8; elder, 9.8-11.1; fol. helladonnae, 15.2-18.2; blessed thistle, 13.5-16.1; digitalis, 9.2-12.8; hyoscyamus, 21.00-25.3; huckbean, 7.5-9.3; salvia, 11.6-12.0; stramonium, 16.2-19.2; uva ursi, 3.0-3.5; wormwood 7.8-11.9; hyssop, 7.9-11.0; peppermint, 11.1-13.8.

A. R. ROSE

Study of the colloidal properties of arsphenamine and allied products. GEORGE W. RAIZISS AND JOSEPH L. GAVRON. *J. Pharmacol.* 20, 163-180(1922).—See C. A. 16, 3712. C. J. WEST

Chemical method of assaying the active principles of digitalis. ARTHUR KNUDSON AND MELVIN DRESBACH. *J. Pharmacol.* 20, 205-20(1922).—See C. A. 16, 3711. C. J. WEST

The use of isopropyl alcohol for hygienic and cosmetic purposes (BORUTTAU) 11H. The neutralization of castor oil (FACHINI, SOMAZZI) 27. Recent developments in the organic chemistry of arsenic (LEWIS) 10.

Dentifrice. H. D. RESNIK. U. S. 1,435,498, Nov. 14. A Cl-forming dentifrice is formed of the usual tooth paste ingredients with the addition of a substance which will liberate a small amt. of Cl when the dentifrice is used, e. g., Ca hypochlorite.

18—ACIDS, ALKALIES, SALTS AND SUNDRIES

FRED C. ZEISBERG

Distillation and concentration of dilute nitric acid. E. BERL AND O. S. SAMTLEBEN. *Chem. Met. Eng.* 27, 1025-30(1922).—See C. A. 16, 2388.

The clarification of brines and treatment of slimes in the manufacture of potassium chloride. LOUIS BUCHERER. *Bull. soc. ind. Mulhouse* 88, 492-500(1922).—At the Amélie potash mines, the hot brine, contg. an av. of about 20 kg. of insol. matter and 25-40 kg. of salt (mostly NaCl) in suspension per m.³, is first passed through a settling tank to sep. the coarser salt particles, and is then sent to a Dorr thickener from which it comes perfectly clarified (a few g. of insol. per m.³). The sludge from the thickener is dild. with an almost equal vol. of mother-liquor and sent to a second Dorr. The clear liquor from the latter (at 60-70°) is sent to the mother-liquor tank in summer and the crystn. pans in winter; it contains 180 kg. KCl per m.³ and yields about 60 kg. per m.³ in winter. Part of the sludge from the second Dorr goes to a kneader whence it is pumped to filter presses, and the remainder is mixed with the salt from the settling tank and sent to an Oliver rotary vacuum filter. The sludge from the first Dorr holds 20% of brine and contains 7-11% KCl (1-3% of the KCl in process of manuf.). The cake from the filter presses contains 14-20% moisture and 5-7% KCl. Attempts to wash the cakes in the presses have not yet been commercially successful; but tests with an exptl. press have given as low as 3-4% KCl. The Dorr thickener and Oliver filter are described. The av. K₂O content of the refined salt is about 59% (93% KCl); two-thirds of the production is obtained directly with a content of over 60% K₂O (95% KCl); the final washing given to obtain 98-99% KCl is appreciably facilitated; and the last third of the salt obtained from the bottom of the crystg. tanks contains about 55% K₂O. The loss in the sludge does not exceed 2%, in spite of the fact that only a low-grade sylvinitic contg. 12% insol. is treated. Diagrams of the process are given.

A. P.-C.

Atmospheric nitrogen fixation. ERIC A. LOF. *Gas Age-Record* 50, 649-51, 697-8, 737-40(1922).—A review of the processes in use. J. L. WILEY

The nitrogen industry. C. H. DESCH. *Nature* 110, 670-1(1922).—A report of discussions at a meeting of the Brit. Assoc. E. J. C.

Spontaneous ignition of escaping hydrogen. PH. POTHMANN. *Z. Ver. deut. Ing.* 66, 938-9(1922); cf. Nusselt, C. A. 16, 1640.—A stream of vapor, escaping under pressure, is negatively charged; this appears to be related to the H₂O content, for dry vapors are not elec. charged. Vapors contg. 3% or less of H₂O have the same order of

magnitude of charge as the pure vapor. Expts. on air and H would indicate that this property is independent of the nature of the gas. The elec. charge appears only if the gas stream contains a solid or a liquid phase. When moist air escapes from an orifice, a glimmer is observed even at 2 atm.; this increases with the pressure up to 40–80 atm., when it is seen as a bluish white light, 40–50 cm. long. It appears to be of ray-like structure and surrounds the escaping gas. If either the air or the H₂O stream is cut off, the light immediately disappears. During the period when the light is brightest, a spark 70 mm. long may be obtained. Temp. also increases the intensity of the elec. charge, the max. being in the neighborhood of 100°. With escaping H the same elec. charge is obtained by the use of low pressures and H₂O at high temp. or by a high pressure and H₂O at ordinary temp. or ice.

C. J. WEST

Stabilizing the sulfur market for industry. H. S. DAVIS. *Ind. Eng. Chem.* **15**, 13–14(1923).

E. J. C.

"Redmanol"—a survey of its many uses. J. C. WINSLOW. *Raw Material* **5**, 392–3(1922).

E. J. C.

Fluorspar and its uses. G. H. JONES. *Blast Furnace & Steel Plant* **10**, 563–7; *Iron Age* **110**, 1215–17(1922).

E. J. C.

Feldspar mining and milling in New Hampshire. R. B. LADDO. *Rock Products* **25**, 25–7(1922).

E. J. C.

The synthesis of mother-of-pearl. L. CLÉMENT AND C. RIVIÈRE. *Chimie et industrie* **8**, 782–4(1922).—Mother-of-pearl consists of CaCO₃ permeated with conchyolin, an albumin similar to keratin, with a variable quantity of water. According to Dubois the animal secretes conchyolin; this assumes the form of a net work, which is subsequently filled by CaCO₃ formed by diffusion in the midst of a colloidal mass. A soln. of 15 parts of a Ca salt (preferably org.) and 5 parts of gelatin in 80 parts of water is spread on the object to be coated with mother-of-pearl and allowed to set. A pptg. soln. (e. g., H₂O 80%, Na₂CO₃ 10%, Na₃PO₄ 2%, gelatin, albumin or casein 8%) is allowed to flow evenly over the gcl. Pptn. is complete in 0.5–1 hr., and the object is washed, hardened with CH₃O and dried. The pearliness is increased by depositing other layers. The surface is built of a very large no. (1,000–1,100 per mm.) of fine threads of CaCO₃ forming a grating to which are due the optical properties of the material. The appearance can be regulated by the moisture content of the pptg. soln., and by the rate at which it is poured on the Ca-contg. jelly. If the Ca soln. contains much more than 80% of water the ppt. formed is continuous, opaque, white or porcelain-like; while if the water content is much less than 80% pptn. occurs with great difficulty. Prolonged heating at 50° of the coated objects renders them chalk-like, the phenomenon being identical with the "death" of mother-of-pearl or of pearl. If a soln. of cellulose acetate or nitrate be poured on an artificial mother-of-pearl object, the film formed on drying will be the exact counter-part of the support and on removing it will have the same pearly appearance as the latter, proving that the color effects cannot be due to the mere presence of CaCO₃ but to its arrangement. Pptn. in very viscous colloidal mediums takes place according to the mechanism of periodic or rhythmic pptn. described by Liesegang and Leduc. C. and R. suggest that the explanation of these phenomena is related to the study of semi-permeable membranes, semi-permeable CaCO₃ membranes being formed through which the pptg. liquids pass by osmosis. Cf. C. A. **16**, 2583.

A. P.-C.

Nitric acid. A. A. NOYES and C. L. BURDICK. U. S. 1,433,969, Oct. 31. A mixt. contg. N oxide and O such as is obtained by oxidizing NH₃ or atm. N is subjected to catalytic oxidation in the presence of a carboniferous catalyst, e. g., charcoal from coconut and columine nut, and then treated with an aq. absorption medium for the N oxide formed.^c

Calcium arsenate. C. B. DICKKY. U. S. 1,434,660, Nov. 7. Ca arsenate is made from $\text{Ca}(\text{OH})_2$ and As_2O_3 in suspension in H_2O . An excess of $\text{Ca}(\text{OH})_2$ is used and NaCl is added to the suspension to increase the soln. concn. of $\text{Ca}(\text{OH})_2$. The temp. is maintained at about 60° for 2–4 hrs. Cf. C. A. 16, 3736.

Potassium compounds from orthosilicates or similar materials. C. ELLIS. U. S. 1,435,693, Nov. 14. Leucite or other K-bearing silicate is heated to a completely fused condition with lime, and K-bearing fumes are collected in 2 sep. portions, one of which includes readily depositing and the other difficultly depositing substances.

Salts from natural brines. F. W. HUBER. U. S. 1,435,524, Nov. 14. Mixed salts contg. largely NaCl with smaller amts. of K compds., such as are obtained as by-products in treating brines, are leached with satd. NaCl soln. until at least most of the K compds. have been dissolved, a portion of the NaCl is removed from the liquor by evapg. to $32\text{--}33.5^\circ$ B $\acute{\text{e}}$. to leave it nearly satd. with K compds. and it is then treated with a soln. of Na_2SO_4 and a double sulfate of Na and K is crystd.

Treating Searles Lake brine. H. W. MORSE. U. S. 1,435,727, Nov. 14. The brine is chilled to remove a portion of the sulfate and is then subjected to solar evapn. to obtain a brine high in carbonate. To this prepd. brine there is added a brine contg. substantially the full K content of raw Searles Lake brine. The operation is regulated so that the original high carbonate and low sulfate content are restored by evapn. before further addition of raw brine to the pond.

Concentrating nitrogen oxides. J. S. BLOWSKI. U. S. 1,434,674, Nov. 7. Dil. N oxides such as are obtained by combining N and O in an elec. furnace are treated with H_2SO_4 to form solid nitrosylsulfuric acid. The latter is subsequently decomposed by steam or H_2O .

Hydrogen sulfide. H. HOWARD. U. S. 1,435,471, Nov. 14. ZnS is mixed with H_2SO_4 in such limited amt. as not to dissolve all the ZnSO_4 formed by the reaction and the mixt. is agitated and heated to form H_2S . Sepd. acid soln. is used on a further quantity of ZnS ore.

Bleaching and detergent composition. C. MCADAM and V. O. OLSEN. U. S. 1,434,550, Nov. 7. A soln. adapted for bleaching and cleaning fabrics and removing rust and fruit stains is formed of hydrofluosilicic acid 16, H_2O 16 and HIF 3 parts. U. S. 1,434,551 specifies a bleaching soln. formed of NaHSO_4 10 and Na silicofluoride 90%.

Tire puncture-healing composition. G. ALTSTÄDTER. U. S. 1,434,764, Nov. 7. A compn. which solidifies as it issues through a puncture is formed of dextrin in a state of fermentation with yeast, mixed with H_2O , kaolin, tripoli and a fermentation-retarder, e. g., a soln. of gum benzoin.

Cleaning and polishing composition. W. J. HURST. U. S. 1,433,887, Oct. 31. A mixt. adapted for cleaning and polishing varnished surfaces is formed of "sulfonated oleic acid oil" 1, H_2O 1 and petrochem oil 2 parts. Turkey red oil neutralized with NH_3 may be used.

Polish for furniture or automobiles. T. G. LOMAX. U. S. 1,435,717, Nov. 14. NH_3 soln. (28%) 2, oil of cedar 12, lubricating oil 16, soln. of asphalt 22, turpentine 4 and kerosene 14 parts.

Metal polish. G. W. KING. U. S. 1,434,124, Oct. 31. Jeweler's rouge one-fourth teaspoonful, "liquid sassafras" one-half teaspoonful, oxalic acid 8 oz., infusorial earth 1 lb., powdered tripoli 2 lbs. and H_2O 1 gal.

Adhesive. H. L. CAMPBELL. U. S. 1,435,377, Nov. 14. An adhesive is prepd. from ground fish scales, ground air bladders of fish, H_2O , HOAc and flour.

Military obscuration clouds. W. K. LEWIS and R. E. WILSON. U. S. 1,433,732, Oct. 31. Clouds adapted for concealing ships are formed from NH_3 and a volatile chloride such as SiCl_4 with moist air as a diluent.

Diaphragms for acoustic apparatus. M. HEPNER. U. S. 1,435,843, Nov. 14. Diaphragms for phonographs, telephones or other acoustic app. are formed of thin uniform mica laminae united by celloid varnish.

Apparatus for graphitizing carbon. T. F. BAILEY. U. S. 1,434,519, Nov. 7. The app. comprises a furnace for satg. Fe with C (which may be added in the form of coke) and a cooling chamber to receive the molten material from the furnace in the form of a thin stream (in nonoxidizing gas) from which graphite is sepd. on cooling.

Rotary kiln adapted for roasting boneblack or fuller's earth. F. FEITER. U. S. 1,434,023, Oct. 31.

19—GLASS, CLAY PRODUCTS, REFRACTORIES AND ENAMELED METALS

G. E. BARTON, C. H. KERR

Problems of the German glass industry. H. KÜHL. *Chem.-Ztg.* **46**, 990-2(1922). E. J. C.

Pyrex glass. PAUL EMILE ERCKMANN. *Chimie et industrie* **8**, 785-91(1922).—A discussion of the requirements of an ideal glass, with a description of the compn. and merits of Pyrex glass and its uses. A. P.-C.

Operating life of tanks. H. W. HESS. *Glass Worker* **42**, No. 5, 13(1922).

J. B. PATCH

Raw material selection. H. W. HESS. *Glass Worker* **42**, No. 7, 13; No. 8, 13, 40(1922).—Natural products such as sand, feldspar, etc., need careful checking, while trouble caused by impurities in manufd. articles such as soda ash, litharge, etc., is comparatively rare.

J. B. PATCH

Glass industry fuel waste. A. J. RITTMAN. *Glass Worker* **42**, No. 9, 13, 38, 40(1922).—There is still much unnecessary waste of fuel due to improper manipulation of valves and dampers in the furnaces and the use of too much steam in the producers.

J. B. PATCH

The chemist in the glass factory. H. W. HESS. *Glass Worker* **42**, No. 10, 21-2(1922).

J. B. PATCH

Fire polishing glassware. H. W. HESS. *Glass Worker* **42**, No. 11, 11, 29(1922).—Sulfuring is remedied by changing the flame from a reducing to an oxidizing condition where it impinges upon the ware. Irregularities in pressure and quality of the gas must be avoided. Compressed air should be scrubbed as it contains dust and oil. The flame temp. of natural gas is insufficient for some purposes, it being often necessary to change to artificial coal gas of lower calorific value but higher flame temp. J. B. PATCH

The weathering of glass containers. K. L. FORD. *J. Am. Ceram. Soc.* **5**, 837-54(1922); 19 photomicrographs.—Dipping in HCl before packing retards weathering and paper properly used is helpful. Continued boiling removes the weathered surface. The products of weathering consist of crystals of sol. salt or salts, chiefly Na_2CO_3 and an insol. film. The CaO , Na_2O and SiO_2 showed the same relative values in the weathered material as in the original glass plus CO_2 , H_2O , dirt and org. matter. Weathering depends chiefly upon soly. Surface condition influences soly. Al_2O_3 increases resistance to weathering. Na_2CO_3 may exist in finished glass and assists in weathering. C. H. KERR

Losses on ignition and porosity of kaolins, clays, bauxites, etc. A. BIGOT. *Compt. rend.* **174**, 1232-5(1922); cf. C. A. **15**, 2533.—Bauxite in its natural state does not disintegrate in H_2O , but kaolin and clays do, regardless of whether in the natural state, or after grinding and compressing. The porosity of the test specimens (ground to 200 mesh, moistened and briquetted at 377 kg. sq. cm.) was detd. by the hydrostatic balance

method—using a mineral oil of known d , instead of H_2O . The samples were immersed in oil for several hrs., under a bell jar from which the air had been evacuated, to avoid errors due to occluded air. The expts. indicate two new observations: (1) Clays, kaolins, and bauxites which contain more than 14% combined H_2O lose most of it around 300° and before 600° . (2) These substances, which are plastic to varying degrees, harden around 400° before normal dehydration and become agglomerated, and they do not disintegrate in cold or boiling H_2O , or in acid or alk. solns. A. R. ALBOUZE

China clay in Quebec. *Can. Chem. & Met.* 6, 243(1922).—The Canadian China Clay Co. is operating deposits at Humberdau, Quebec. The kaolin zone is about 1,000 ft. wide and 7,000 ft. long, but has not been fully prospected. The china clay occurs in veins and pockets in quartzite rock and although much of it is stained with Fe it makes a very good fire clay. A shaft of 100 ft. has been sunk and a lens of some 200 ft. by 60 ft. developed. O. P. R. OGILVIE

The mechanical movement of water through certain clays and its control. H. G. SCHURECHT. *J. Am. Ceram. Soc.* 5, 928-36(1922).—Expts. showed that permeability of clays to H_2O is independent of time between 2 and 10 days. P is nearly const. in the formula $P = W/T$ in which W = total H_2O passing through in T days. This factor P for N. Car. kaolin was 1.55 ± 0.05 , for English china clay 1.45 ± 0.06 , for Georgia clay 0.938 ± 0.07 , for S. Car. clay 0.637 ± 0.07 , and for Tenn. ball clay 0.64 ± 0.08 . In capillarity figures the Georgia clay was correspondingly low. P for Tenn. ball clay was increased from 0.64 to 1.20 by adding 0.7% NaOH and that of kaolin from Dry Branch, Georgia from 0.938 to 1.72 by calcining to 450° . Many Georgia clays, by either adding an alkali or calcining or both, may be made more like the English china clay and thus avoid cracking in drying and in burning. C. H. KERR

The expansion of silica brick in coke ovens. ANON. *Brick Pat. Trades J.* 30, 6 (1922).— SiO_2 brick used for coke ovens in England is made of a mixt. of clay and SiO_2 rock contg. less than 84% SiO_2 . Brick contg. more SiO_2 expands too much in firing. This expansion takes place much more rapidly at high temps. than at low. For this reason SiO_2 brick which may safely be fired at 1200° spalls badly when fired rapidly to 1400° . Tridymite has the least expansion when heated but it has not yet been found practical to make brick wholly of tridymite. The best that can be done is to burn brick thoroughly at a temp. sufficiently high (about 1400°) to reduce this expansion to a minimum. H. G. SCHURECHT

Comparison of hot and cold modulus of rupture for silica brick. E. N. MCGEE. *J. Am. Ceram. Soc.* 5, 888-90(1922).—The purpose was to obtain modulus values at temps. found in coke ovens and to compare them with modulus values or crushing strength of cold bricks. Conclusion (1) the modulus at 1350° is about $1/3$ that of cold bricks, averaging 130-189 lbs. sq. in. in the samples tested; (2) too rapid heating may cause breakages at very low values; (3) modulus decreases as temp. increases; (4) modulus figures on cold bricks seem comparable with those on hot bricks and, being so much easier to make, are recommended. C. H. KERR

The making and marketing of common brick. J. B. ROSE. *N. J. Ceramist* 1, 198(1921).—Conditions in the Hudson River district are described. C. W. P.

Burning a down draft kiln. ELLIS LOVEJOY. *The Clayworker* 78, 346-8(1922).

J. W. HEPPLERWHITE

Chrome refractories. J. S. McDOWELL AND H. S. ROBERTSON. *J. Am. Ceram. Soc.* 5, 865-87(1922).—An excellent review article with complete bibliography.

C. H. KERR

Comparative tests of English and domestic whittings. A. E. WILLIAMS AND B. J. WOODS. *J. Am. Ceram. Soc.* 5, 901-15(1922).—Twenty-two samples were tested. Although the English whittings contain more fine, colloidal material, the Am. whittings

are fine enough for all ceramic purposes. This has no apparent effect in the fluxing of body or glaze but may influence flotation of the frit in glazes with low % clay. Tentative specifications are proposed. Quality—It shall be made from purest limestone, be free from FeS_2 , Fe-bearing silicates, metallic Fe or gypsum and be uniform. Compn.—Limits shall be: Fe_2O_3 max. 0.2%, MgCO_3 max. 2.0%, CaCO_3 min. 95.0%, total carbonates min. 97.0%, S none. Fineness—Washing gently for 10 min. shall leave a residue of not over 1% on a 140 screen or 2% on a 200 screen. A Pearson air separator shall show at least 85% finer than 0.02 mm. and at least 48% finer than 0.01 mm. As an alternative to the Pearson test (but less desirable) shake 2.5 g. with 250 cc. distd. H_2O for 10 min. in a 250 cc. graduate cylinder. It shall require at least 20 min. for visible settling to cease.

C. H. KERR

The witchery of glazes. P. E. COX. *J. Am. Ceram. Soc.* 5, 939-44(1922).—Artistic and scientific developments must go together.

C. H. KERR

Use of ox gall in prevention of crawling of glazes. H. SPURRIER. *J. Am. Ceram. Soc.* 5, 937-8(1922).—Crawling may be entirely prevented by adding a little ox gall in soln. The action is attributed to the lessened surface tension.

C. H. KERR

The relation of fineness of grinding to opacity in white enamels. B. T. SWERLEY AND E. S. PRINCE. *J. Am. Ceram. Soc.* 5, 855-7(1922).—Uniform fineness of grinding is essential in the production of uniform opacity. Proper control of grinding will largely eliminate the necessity of aging.

C. H. KERR

Manufacture of single-coat gray enameled ware. H. C. ARNOLD. *J. Am. Ceram. Soc.* 5, 858-64(1922).—In prepn. of the black shape caustic cleaning is about 80% as reliable as acid dipping and scaling (or annealing). Shapes are boiled for 2-3 hrs. in an 8% soln. of NaOH or other alkali. For pickling a 4-8% hot H_2SO_4 or cold HCl soln. is used. The clay used in the batch is very important—a plastic kaolin or china clay is best. Best results have been obtained with a high feldspar, low quartz and fluor spar mixture. Three good formulas are given. Methods of applying and burning are described.

C. H. KERR

Abrasives—an outline of their history. M. HANBY. *Raw Material* 5, 350-2 (1922).

E. J. C.

The effect of dissolved substances on the deposition of colloidal particles from a solution by means of an electric current (KLEEMAN) 4.

Kiln for firing pottery and other similar articles. C. F. BAILEY. U. S. 1,434,730, Nov. 7.

Spark-plug insulation. T. G. MCDUGAL. U. S. 1,434,133, Oct. 31. Bentonite 5% or less is used with calcines 60%, china clays 30% and a small amt. of ball clay.

20—CEMENT AND OTHER BUILDING MATERIALS

C. N. WILEY

A study of chemical reactions in the burning of lime and portland cement. G. A. RANKIN. *Concrete* (Mill section) 21, 72-77(1922).—The paper is principally concerned with the cement kiln but some of the data are also applicable to lime burning. Three series of reactions are considered: (1) the driving off of CO_2 , (2) formation of the clinker, and (3) the burning of fuel. The work involves the investigation of samples taken every 10 ft. throughout the length of a 125-ft. kiln (the ordinary chem. analysis is supplemented by microscopic exams.), and lab. expts. On the basis of this work, the work of other investigators, and theoretical considerations, R. concludes that the first two series of reactions take place economically but the third is not economical. The temp. of the

flame should be increased; one way to do this is to supply O for burning the fuel rather than air.

J. C. WYRR

Influence of the hardening of cement and lime mortars in steam under pressure on the mechanical strength of these mortars. LÉON BERTRAND. *Bull. officiel direction recherches sci. ind. inventions* No. 36, 608-15 (Oct. 1922).—Steaming under 8 kg. (per cm.²) for 3.5 hrs. doubles the strengths of neat cement and of mortars (1 of cement to 2 of sand), and gives them the same bardness as test pieces kept at ordinary temp. for a month. Too rapid cooling affects the strength adversely. The conditions of further tests on cement and bydraulic lime are described in detail and the results are tabulated and shown graphically. The strength of the pieces treated in the usual manner increased during the whole 12 weeks of the tests. In pieces treated in the autoclave, the tensile and crubing strengths both decreased fairly rapidly, reached a min. in less than 7 days, and then increased fairly rapidly, the lime regaining its initial strength and the cement exceeding it. The similarity in the behavior of the lime and of the cement tends to show that the phenomena of setting are of the same nature in both and probably related to the development of aluminates. The action of steam in the autoclave treatment causes a progressive transformation which gives rise to some unstable form of combination, which gradually changes to a stable state. As the strength of the steamed test pieces is in every case much higher than that of the unsteamed pieces, the final stable state of the former must be quite different from the final state obtained by ordinary setting in a moist atm. or under water at the ordinary temp.

A. P. C.

Durability of concrete in alkali soils. G. M. WILLIAMS. *Can. Eng.* 23, 533-34 (1922).—The work of the Committee on Deterioration of Concrete in Alkali Soils of the Eng. Inst. of Canada is discussed. The investigation is divided into 3 phases: (1) field and lab. studies to det. the general nature of the deterioration, whether mechanical or chem.; (2) qual. and quant. study in the chemical lab. of the nature of the chem. reactions which occur when various salt solns. are brought into contact with portland cement; (3) testing out under practical working conditions such conclusions and materials as may have resulted from chem. research. Early field studies have demonstrated that there is a definite problem which involves more than merely the mechanical disintegration due to the crystn. of the salts in the pores of the concrete. Therefore, further work in phase (1) can be of little or no assistance in furthering the chem. studies of phase (2), and the Committee early decided to concentrate its energies on chem. research. Results so far obtained justify this decision. While concrete of good quality with proper protection should have long life when exposed to sea water, exposure to sulfate waters of high concns. will very probably result in disintegration. Concrete of high cement content and low permeability has the greatest resistance. Disintegration in sulfate waters is primarily chem. The possibility of deterioration is considerably smaller when the salts are mainly chlorides or carbonates. Cf. C. A. 16, 3190.

J. C. WYRR

Hardening reinforced concrete. E. MAIER. U. S. 1,434,959, Nov. 7. After molded concrete has partially set it is treated with steam for about 9 hrs. under about 185 lbs. pressure per sq. in.

Cement products containing iron filaments. P. J. TABOURIN. U. S. 1,433,045, Oct. 24. Fe filaments are placed in a mold and agitated during the introduction of a cement mixt. into the mold in order to effect a uniform admixt., e. g., in forming railway sleepers.

"Artificial asphalt" for paving. H. KAMBACH. U. S. 1,433,137, Oct. 24. A product for making compressed paving material or for regenerating broken natural asphalt is formed of coal tar pitch 70, coal tar 15, anthracene oil 15 and linseed and rape seed oil or similar vegetable oils 10 parts for each 1000 parts of comminuted stony material.

Floor coverings. L. KIRSCHBRAUN. Brit. 186,816 June 6, 1921. A floor covering consists of a no. of plies of felted fibers manufactured and combined in a multi-cylinder paper machine. The inner plies are formed from pulp to which is added a non-adhesive emulsion of asphalt or pitch, clay, and H_2O , of the type described in 151,029 (C. A. 15, 598). The outer plies are composed of pulp substantially devoid of this emulsion, but they may be impregnated with oils at the calender rolls. Suitable oils for this purpose are linseed oil, chinawood oil, and stearine pitch. Designs may be printed on the surface of the material after calendering. Suitable fibers for the outer plies are Kraft, sulfite, and rope stock, to which leather treated with NaOH and pptd. with alum may be added. For the inner plies rag fibers, either alone or mixed with sulfite and sulfate or with papers and sawdust, are suitable. A fixing agent, such as Na_2SiO_3 followed by $Al_2(SO_4)_3$, may be added to the stock to cause the clay and bitumen to attach themselves to the fibers.

Roofing and building sheets. J. A. ROWSE. Brit. 186,105, May 21, 1921. Hydraulic lime reinforced with vegetable fiber is pressed, dried and trimmed. A saponaceous compd. and silicates may be added. Cf. 2128, 1874, 3114, 1881, and 9740, 1912.

Refractory heat-insulation. F. OTTMAN. U. S. 1,435,416, Nov. 14. A compn. suitable for building fire-resisting walls is made from kieselguhr 81 mixed with fibrous asbestos 9 and Ca phosphate (formed from lime and H_3PO_4) 10 parts.

21—FUELS, GAS, TAR AND COKE

A. C. FIELONER

Economical use of bituminous fuels. J. B. C. KERSHAW. *Elec. World* 80, 1317-24(1922).—A resumé. Different types of boiler settings are described, also theories regarding the causes and compn. of black smoke. The general conditions to be observed in the design and setting of any type of boiler to insure efficient operation are pointed out. The use of gas or of coal ground to a fine powder is advantageous. Owing to the intimate mixt. of fuel and air, the air required for complete combustion can be reduced nearly to the theoretical proportions. For dust-firing the vertical type of boiler is best adapted. Such a boiler is illus. W. H. BOYNTON

Fuel economy: The control of the combustible process. J. B. C. KERSHAW. *Beama* 11, 745-52(1922).—The chief losses in boiler heating occur with the waste gases. Formulas are given for calcg. the number of lb. of air used per lb. of fuel, also a table showing heat losses due to excess of air. Testing of flue gases is discussed, with reasons for failure of automatic CO_2 recorders. Details of construction of automatic CO_2 recorder and gas-sampling app. are given. For temp. measurements glass-Hg thermometers are recommended up to $1000^\circ F$. For higher temps. elcc. measurement is suggested. The Pery radiometer is proposed for very high temps. Details are given for calcg. heat losses from data obtained. A. H. DICK

Pulverizing fuels. A. B. HELBIG. *Chem. App.* 9, 197-201, 213-15(1922).—A discussion of the prepn. of, and firing with, pulverized fuels, with 25 cuts of different types of pulverizers and 1 cut of plant. J. H. MOORE

What is wet steam? H. VOGES. *Chem. App.* 9, 215-17(1922).—Most of the H_2O in so-called wet steam is due to entrainment and should be trapped inside the boiler, thus saving 5-20% on fuel besides reducing dangers to pipes and engines. J. H. MOORE

Naphthalene as a fuel for explosion motor. A. B. *France-Belgique* 2, No. 4, 36-8(Oct. 1922).—Brief discussion of the merits of naphthalene as a substitute for gasoline in motors. The motor must be started up with gasoline, the exhaust being

used to melt the naphthalene. The av. consumption is about 300 g. per h. p. hr.

A. P.-C.

New improved methods for peat utilization. J. STEINERT. *Z. angew. Chem.* 35, 553-55(1922).—The peat studied contained H_2O 25-30, combined H_2O 15, N 1-2, fixed C 30-35, and hydrocarbons 10-15%. The peat is dried to about 10% H_2O by the heat of waste gases. Briquets are made from this fuel by means of 250-400 atm. pressure. Peat yields 30-35% S-free coke low in ash. The tar contained paraffin 15, heavy oil 15, light oil 12, and phenols 41%. About 50% of the N was obtained as NH_3 .

C. T. WHITE

The classification of coal. H. F. BAIN. *Ind. Eng. Chem.* 15, 99(1923); cf. PATT, C. A. 16, 3741.

E. J. C.

The German brown coal industry. E. GRAEFE. *Petroleum Times* 8, 779-82 (1922).—Three kinds of brown coal occur in Germany: "Pyropissit," an almost white coal, which melts like sealing wax in the flame, "Schwelkohl," light brown in color, and the dark "Feuerkohle," used for making briquets or in the crude state in sugar factories or power plants. "Pyropissit" is the best tar-producing coal but it is now nearly exhausted in Germany. "Schwelkohl" is distd. entirely in Rolle retorts. Only 2% of the retorted coal is consumed during heating. Five tons of coal produce about 1.5 tons of coke, 3 tons of tar and 600-800 cu. m. (25,000 cu. ft.) of gas. The process is continuous. No NH_3 is recovered. The brown-coal tar, when cold, is a soft buttery mass, m. about 20-30°. It contains very little benzene and its principal ingredients boil between 150-400°; they consist chiefly of paraffin and olefin hydrocarbons, the most valuable being paraffin itself. The tar is distd. under partial vacuo, 10-40 cm. of mercury. The distillate is treated by washing in alc. The lighter oils are used as lamp oil or for oil engines and as motor fuel. The gas oils and heavy oils are used for Diesel motor fuels and for making solid lubricants.

D. F. BROWN

The composition and calorific value of coal mined from the lower levels of the mine of Kenadza, Algeria. A. FOIX. *Bull. soc. chim.* 31, 813-6(1922).—Results of analyses made on coal taken from the upper and lower levels of the mine are given. Coal obtained from the lower levels contains 2-4 times as much ash as that obtained in the levels nearest the surface. The av. ash content of the coal from the lower levels is 7.6%. The S content of the coal of the upper levels is about 1.0%, while the S content of the lower levels is about 3.0%. The N content of the coal of the upper levels is about 0.5% as compared with 2.5% for coal from the lower levels. The calorific value as detd. by the bomb calorimeter and by calcn. agrees very well for coal from the upper levels but does not check satisfactorily for coal obtained from the lower levels.

C. T. WHITE

Oxidation of different varieties of carbon and coal by chromic anhydride. DANIEL FLORENTIN. *Bull. soc. chim.* 31, 1068-72(1922).—To det. C in fuels, a 100-cc. round-bottom flask with a large neck was fitted with a ground-glass stopper having 3 outlets corresponding, resp., to (1) a 25-cc. dropping funnel, (2) a small reflux condenser and (3) an aspirating tube, which extended almost to the bottom of the flask. After rising to a bulb the extremity of the condenser tube was bent back 2 times in a convenient way for attaching the absorbing system. A known wt. (about 300 mg.) of the material was introduced into the flask with 10 cc. of H_2O and then 10 g. of pure CrO_3 added. The app. was stoppered and the aspirating tube connected with a wash bottle contg. $Ba(OH)_2$. The absorbing system consisted of (1) a U-tube filled with pumice moistened with concd. H_2SO_4 , (2) a Maquenne bubbler filled with KOH soln., (3) a U-tube, one arm of which was filled with solid KOH and the other with pumice and concd. H_2SO_4 , (4) a protecting tube filled with pumice and concd. H_2SO_4 and (5) an aspirator. There is an error due to CO formed. This can be avoided only by oxidation of the CO con-

tent of the gases by passage before absorption through a column of CuO heated to redness. The C contents were compared with those obtained by the Dumas method. The following are typical: $H_2C_2O_4$ contg. 19% C. found 19%; $H_2C_4H_4O_8$ contg. 32%, found 31.75%; lampblack contg. 96.1%, found 96.16%; graphite contg. 96.60, found 96.45%; coke contg. 89.7%, found 89.33%; anthracite contg. 87.0%, found 87.5%; coal contg. 76.2%, found 76.5%; forge coal contg. 84.1%, found 84.1%. The expts. confirm the existence of an *atomic structure of C* similar to that suggested by Aschan (C. A. 3, 1989; cf. *Bull. soc. chim.* 31, 727(1922)); it is probable that oxidation in the wet way of a mol. of C is preceded by formation of a complex such as that suggested by Rhead and Wheeler (C. A. 7, 2362) to explain the phenomena of oxidation of C by gaseous O.

H. M. McLAUGHLIN

Preparation of briquets from coal sludge. WALTER GRUNOW. *Arch. Wärmewirtschaft* 3, 212-3(1922).—The briquets were made in a brick-yard of Silesian coal fines mixed with varying amts. of lignite or peat. They were suitable for domestic and bakery use.

ERNEST W. THIEL

Interpretation of results of coal washing tests. T. FRASER AND H. F. YANCEY. *Trans. Am. Inst. Mining Met. Eng.* No. 1194C, 23 pp.(1922).—The difficulties of interpretation of the data obtained in coal washing tests because of the many factors involved are discussed. The results of coal washing expts. as shown by analytical and sink-and-float methods, comparative value of efficiency numbers, yield curves, economic considerations, together with the uses and limitation of the various methods are reviewed. Eight tables of analyses, chem., sink-and-float, and sp. gr. obtained in coal washing expts. are given. Five figures show graphically: the fixed and removable impurities in several samples of the same coal; the yield-sp. gr. of some English (Drakeley) and American coals, float-and-sink yield curves for ash and S in an Illinois coal; yield curves for ash, sink-and-float and amt. realized per ton for an Indiana coal; and a Hancock chart illustrates a method calcg. the possible increase in value of a ton of raw coal which might be secured by using solns. of gravity from 1.30 to 1.80. A drawing is given of a quarter-size lab. table equipped with compartments for sepg. the collected washed coal so that data may be secured for the direct comparison of yields. From a study of Drakeley's formulas and Delamater's equations F. and Y. propose the following formulas for best expressing washery operations: (actual yield)/(standard yield) \times (actual ash reduction)/(standard ash reduction) or (yield of washed coal)/(yield of float coal) \times (raw coal ash - washed coal ash)/(raw coal ash - float coal ash). The conclusions reached are: that the greatest source of error in both the formula and the yield-curve methods lies probably in the results of the sink-and-float tests, owing to the difficulty in securing a representative sample, possibility of error in making the sepn. and because a soln. of higher sp. gr. gives greater precision by this test than a lighter soln. A complete sp. gr. analysis would be much more satisfactory than a sink-and-float test on one soln. as a basis for comparing washery operations on different coals. In detg. the effectiveness of a washery in operation the nature of the coal is a more important factor than the type of washer used, some dirty coals showing a higher qual. efficiency than a comparatively clean coal. The economic factors must also be considered with the degrees of mech. sepn. obtained. No one formula can be obtained which may be applied indiscriminately to all cases and conditions to produce efficiency numbers. These efficiency calcs. become more dependable and their chief value is when they are applied to comparing operations on the same coal to det. the most suitable method of treatment, or comparing with the same equipment results on different coals to det. their washability.

W. W. HODGE

Methods of dry cleaning and dust collecting at the coal-concentrating plant of the American Coal Co. ANON. *Coal Age* 22, 875-7(1922).

E. J. C.

Air preheating for small industrial furnaces heated with water-gas and with coal. JOHS. SCHMIDT. *Feuerungstechnik* 11, 6(1922).—The most that can be saved in this way is less than 12%, which will not pay for the installation. The best means of saving heat is by preheating the charge.

ERNEST W. THIELE

Soot. O. BINDER. *Wärme & Kälte Tech.* 24, 211-3(1922).—A measured vol. of boiler flue gas was drawn through an asbestos plug in a glass tube. The tube was then placed in an ignition tube and the C detd. The results of 59 detns. are given. In general, soot increases with CO₂ content in the gases, and volatile matter in the coal.

ERNEST W. THIELE

Gasification of raw brown coal. ERICH DUBOIS AND GEORG MÜLLER. *Z. Ver. deut. Ing.* 66, 821-4(1922).—In gasifying German brown coal with 50-60% moisture preliminary drying is used. The size of the coal must be preserved as far as possible; hence there should be little agitation. Since the temp. is limited by the nature of the coal, a large heating surface is required. The drying is best done by passing hot gases through the coal. The exptl. plant at Saarbruck of the A. G. für Brennstoffvergasung of Berlin is described. In tests on a brown coal of 58.7% H₂O and 1945 net heat value the amt. of tar recovered was nearly 3 times as much when the coal was dried to 20% as when dried to 40%. The influence of the degree of drying on the heat value of the gas was not shown. On drying to 40% H₂O and using air satd. at 70° under the producer the gas had a heat value of 1458 kg. cal. per m.³ and the compn. CO₂ 9.4, O₂ 0.3, CO 22.7, CH₄ 3.8, H₂ 17.2, N₂ 46.6. In drying to 40% H₂O 306 cal. per kg., corresponding to 0.210 m.³ of gas per kg., were required. The yield of gas was total 1.195 m.³, net 0.985 m.³ per kg. The heat recovered in the gas was 73.9% and in the tar 2.8% of the heat in the coal. For power 155 cal. per kg. are required giving a net efficiency of 68.7%.

J. J. MORGAN

Producer-gas equilibrium at high pressures. K. JELLINEK AND A. DIETHELM. *Z. anorg. allgem. Chem.* 124, 203-29(1922); 11 figs., 7 tables.—The equilibria in the reaction $C + CO_2 \rightleftharpoons 2CO$ were investigated for temps. between 800 and 1000° and for pressures up to 50 atm. for the so-called amorphous coals. The app. used for the detn. was a specially constructed *elec. furnace* (described in detail) for detns. up to 150 atm. and 1300°. The equilibria for both amorphous coals and graphite agree very closely. Complete agreement was also found, up to the temps. investigated, between the producer-gas equilibria and the law of mass action. It is probably also true at still higher pressures. Primarily the generator reaction is probably a heterogeneous gas reaction, by which the validity of the law of mass action at high pressures is established. The integration const. of the isochor reaction in the producer gas equilibria agrees fully with that calcd. from the chem. consts. in Nernst's heat theory. It follows from the producer-gas equil. and the CO₂ dissociation equil. that with practically approachable temps. and pressures the max. work performed by the reaction $C + O_2 \rightleftharpoons CO_2$ is equal to the heat tone in case the initial O pressure and the final CO₂ pressure are alike and the reaction takes place isothermally and reversibly.

J. L. WILEY

City gas from by-product ovens. A. I. PHILLIPS. *Gas Age-Record* 50, 689-92, 709-12(1922).—For city gas that process is preferable which requires the smallest quantity of materials to be purchased and the smallest quantity of by-products to be sold in the competitive market. The probable development of the by-product coke oven in supplying gas to utility companies will be their operation in conjunction with water gas plants whereby the quantities of materials to be bought and sold will be very considerably reduced and greater flexibility in operation assured.

J. L. WILEY

Physical and chemical foundations of benzene recovery and the best system therefor. F. PLENZ. *Gas u. Wasserfach* 65, 523-7(1922).—The heat requirements for intermittent distn. of benzene may be divided as follows: 63-65.8% for preheating

the wash oils; 2.7-3.4 for evapn. of the light oils; 27.7-21.8 for direct steam and 6.6-9.5 for rectification. The following systems are described: Bamag, Dr. Otto, Hempel, Koksgasgesellschaft, Meguin and Gasser & Frank. J. L. WILEY

Bituminous water gas fuel economy. W. A. DUNKLEY. *Gas Age-Record* 50, 795-7(1922).—A comparison of costs in using either coke or bituminous coal as generator fuel. In favor of coal. J. L. WILEY

Relation between chamber width and coking period in coke ovens. A. RÜHL. *Glückauf; Iron Coal Trades Rev.* 105, 803(1922). J. L. W.

The manufacture of ammonia at the Cracow gas works. D. WANDYZ AND M. SEIFERT. *Przegl. Gasown.* 2, 1-3(1922); *Chimie et industrie* 8, 847(1922).—The yield of NH_3 at the Cracow gas works was improved by installing a tower to support the tank from which water was fed to the purifying system. The tank is divided into two compartments into one of which the weak wash water (after the Standard) is led, while the stronger wash water (after the first washer) goes to the other. The feed to the washers is thus made more regular, and danger of leaks, should the gas pressure increase, is eliminated. A. P.-C.

Benzene recovery in the Vienna gasworks. DOLLINGER. *Gas u. Wasserfach* 65, 537-40(1922).—D. discusses steam and wash-oil consumption, corrosion of app., and the effect of benzene recovery on the properties of the gas. The income from the benzene production alone amounts to 8.5% of the cost of the coal and 15.2% of the total income from all by-products, the remainder being coke 75.8%, tar 6.9, NH_3 1.4 and miscellaneous 0.6. Removal of 26 g. of benzene per m^3 reduces the calorific value of the coal gas from 5450 to 5190 cal., and the mixed gas (57.4% coal gas and 42.6% of blue water gas) from 4300 to 4150 cal., and the gas vol. by 0.43%. This reduction in calorific value results in an increased consumption of 2.44%, which, with the reduction in gas vol., requires an added consumption of 3.8% of coal per 1000 m^3 . Complete stoppages of gas pipes, due primarily to the formation, by the corrosive effects of H, O, and cyanide compds., and to the deposition of rust particles in the bends and elbows, have been reduced from 12.2% in 1919 to 7.4% in 1921 by allowing from 8 to 25 g. of naphthalene per 100 m^3 , depending upon the season and the temp., to remain in the gas. J. L. WILEY

Operation of water-gas plants. R. GEIPERT. *Gas u. Wasserfach* 65, 441-6, 457-65(1922).—G. discusses the chem. and thermal reactions in the generator, the cooling and washing of the water-gas, the slagging of the generator, and the utilization of waste heat. J. L. WILEY

Progress in benzene recovery methods. F. RASCHIG. *Gas u. Wasserfach* 65, 655-8(1922); diag.—A benzene recovery plant capable of treating 100,000 m^3 of gas daily is described; it consists of 3 Fe cylinders 2 m. in diam. and 4 m. high filled with Raschig rings. The gas passes through each tower countercurrent to the wash-oil which circulates at the rate of 20 m^3 per hr. and absorbs benzene up to 3%. Four m^3 of the enriched oil are collected each hr. and passed on, first to a heat exchanger and then to a continuous distn. app. heated by indirect steam and under a vacuum whereby the benzene is given off in vapor form, being later washed, cooled and condensed. Since the benzene does not at any time come into contact with direct steam, it is practically water-free. The consumption of steam and cooling water is claimed to be very moderate. The process is protected by Ger. patent 298,823. J. L. WILEY

Economic aspect of modern carbonizing methods. THOS. CARMICHAEL. *Gas J.* 160, 551-61(1922).—A description of the Portsmouth gas works with working results and costs. The plant consists of vertical and horizontal retorts, blue water gas and carburetted water gas app. J. L. WILEY

Individual or central generators. L. LITINSKY. *Gas u. Wasserfach* 65, 621-6

(1922).—The advantages and disadvantages of each type as applied to gas works are set forth in detail. J. L. WILEY

Heat economies in producer operation. H. R. TRENNKLER. *Arch. Wärmewirtschaft* 3, 193-6, 207-11(1922).—The analyses, observations, and calcs. needed for a heat and material balance of a producer are discussed. It is best to base the heat balance on the heat input from the fuel only. A producer should always be run as cold as possible. High-grade fuels should be mixed with low-grade. Producer gas should always be cooled before it is used. ERNEST W. THIELE

Operating results from a double-gas plant at Chemnitz, Schipke. *Gas u. Wasserfach* 65, 543-5(1922).—A mixed gas of 4140 cal. may be produced by the double-gas process at a cost about 25% less than by the vertical-retort process with steaming. J. L. WILEY

Flow of gas in pipes. R. SEELIGER AND G. MIERDEL. *Gas u. Wasserfach* 65, 618-21, 635-40(1922).—A theoretical and mathematical discussion. J. L. W.

Status of therm basis in Britain. C. H. S. TUPHOLME. *Gas Age-Record* 50, 801-2, 835-8(1922).—A study of the operation of the Gas Regulation Act. J. L. W.

Carbon dioxide content of flue-gas, hourly evaporation and efficiency. J. HUBLER. *Feuerungstechnik* 11, 1-4(1922).—For a given load on the boilers, the increase in efficiency produced by decreased excess air is greater than that computed from the decrease in the quantity of flue-gas, since the temp. of the flue-gas must also decrease. The effect is greater with fuels high in H₂O. ERNEST W. THIELE

Electric flue-gas tester. KARL STEIN. *Wärme & Kälte Tech.* 24, 236-7(1922).—The app. depends on the fact that CO₂ has a smaller heat cond. than the other constituents of flue-gas or air. Two identical Pt wires form 2 arms of a bridge; they are heated by a current. One is in a tube contg. air; the other is in a tube through which the flue-gas is passed after being freed from H₂O and dust. A galvanometer shows the CO₂ content directly. The app. can be made recording at a distance of one kilometer. It has a small time lag. ERNEST W. THIELE

The pocket gas tester. H. STRACHE AND K. KLING. *Feuerungstechnik* 11, 13-5(1922).—This is a small portable app. for CO₂ detns. One chamber of a small pump is filled with the gas to be tested. One stroke of the pump forces the sample into a bottle contg. soda lime; at the same time an equal vol. of CO₂-free gas is drawn into the other chamber. The CO₂ content of the gas is read off directly on a manometer showing the reduction of pressure in the bottle below atm. The accuracy is 0.5%; a detn. takes 10-20 sec. ERNEST W. THIELE

Körting low-pressure oil burner. OTTO H. BINNER. *Wärme & Kälte Tech.* 24, 167(1922).—This is for small heating plants. The burner is provided with an ignition muffle and a small combustion chamber, to secure even heating of the boiler. ERNEST W. THIELE

Coke-oven plants with water-cooled doors or frames. ANON. *Wärme & Kälte Tech.* 24, 186-7(1922).—The doors are hollow; circulation of water through them is effected by placing the cooling tank at a considerable elevation. No pump is used. ERNEST W. THIELE

The Quiévrain coke ovens. NESTER URBAIN. *France-Belgique* 1, 336-43(1922).—A description of the plant and of the process used. A. P.-C.

The new heat theorem of Nernst [applications to combustion] (SCHMOLKE) 2.

Pulverized fuel. W. L. McLAUGHLIN. U. S. 1,435,540, Nov. 14. Coal or similar fuel is prep'd. with about 5% uncombined moisture content and of such fineness that over 50% of it will pass a screen with 200 meshes per linear in. A fuel of this character is adapted for use in furnaces when properly mixed with air.

Coking coal. H. H. DOW. U. S. 1,435,219, Nov. 14. Coal is first heated in a generator to drive off most of the readily volatilizable constituents, steam is blown through the material to form water gas and cool the material and a portion of the coke formed is removed. Air is then admitted to form producer gas, the temp. is raised and a fresh charge of material is added.

Coal gas collecting main and ascension pipe. C. V. McINTIRE. U. S. 1,433,634, Oct. 31.

Gas producer. J. C. MILLER and A. ISLES. U. S. 1,435,322, Nov. 14. A rotating device is mounted adjacent the inner wall of the producer, to grind clinker formed on or near the wall.

Coke-oven decarbonization. L. WILPUTTE. U. S. 1,435,361, Nov. 14. Decarbonizing air is introduced into fuel gas supply channels extending into the coke-oven structure.

22—PETROLEUM, ASPHALT AND WOOD PRODUCTS

F. M. ROGERS

The significance of surface tension in petroleum science. L. GURWITSCH. *Petroleum Z.* 18, 1169-78(1922).—Surface tension of petroleum and petroleum products is discussed as to its bearing on emulsions. Methods of detn. of surface tension are described and data are given for various petroleum and petroleum products. The two principal types of petroleum emulsions are those in which fine particles of water are seen floating in oil, coming into contact with each other, and those containing relatively large drops of water surrounded by an oil film. Dissolved substances in one of the phases may lower the surface tension, thus reducing the tendency of particles of the emulsion to unite, i. e., make the emulsion more permanent. These impurities may be either added soaps or may consist of asphaltic or resinous compounds in the oils themselves. Surface tension also explains the emulsions formed by suspended solids in oil-water mixtures and is the cause of their great stability. Only those Na salts of the fatty acids series which form colloidal soaps exert this influence. The lowest member of the series is lauric acid ($C_{12}H_{24}O_2$). Surface tension detn. of oils to det. their emulsifying ability is recommended. The results are more satisfactory if the vol. of the drops of oil from a capillary in water be detd. Applications of the surface-tension theory of emulsions to all kinds of petroleum and petroleum products emulsions are discussed and illustrated with tabulated data.

D. F. BROWN

Refinery efficiency a paramount need. C. O. WILLSON. *Oil and Gas J.* 21, No. 27, 16, 98(1922).—In the Coast improved cracking process a heavy pressure still is used. A preheater raises the gas oil to a uniform temp. of 400°. The still is surmounted by a dephlegmating drum, above which is the reflux tower connecting with the 2-inch vapor line passing to the receiver house. The still pressure is maintained at 80-90 lbs. From the pressure control valves the vapors pass to the condenser under atm. pressure. The pressure benzine from the condenser passes to the gas separator and then through a meter to the receiving equipment of the usual refinery design. The distn. process is continuous. Tables are given showing the efficiency of the process.

D. F. BROWN

Sealite a means of fighting evaporation loss. J. M. JENNINGS. *Nat. Petr. News* 14, No. 50, 40-3(1922).—Factors affecting evapn. from oil storage tanks are, escape of excess permanent gas, exchange of dissolved gas for air, breathing, diffusion and windage, and hoiling. Methods of protecting tanks from fire hazards and evapn. losses are described. Sealite is the best protection of this sort yet discovered. It is a viscous fluid, weighing about 4.75 lbs. per gal. and flowing freely down to 25° F. The chief ingredients are glucose, corn starch, glycerol, $CaCl_2$, and glue, which are so mixed that the moisture content of the substance remains const. Fluctuation in temp. does not

affect its properties. It is sol. in water in all proportions and insol. in any petroleum oil. Its life is about 1 year; agitation decomposes it somewhat; its soly. in water demands watertight roofs. Tests show that 80% of evapn. which would otherwise occur is prevented by the application of sealite. It also affords fire protection. D. F. BROWN

Oil shale. E. HENTZE. *Petroleum Z.* 18, 1233-47(1922).—Primary shales are those in which the bitumen occurs in the shale itself, while secondary shales are those from which it has migrated away. Estonian shale is of 2 classes, the black, bituminous clay shale or Dietyonemaschiefer and the yellow shale or Kukersite. Both belong to the "primary" shale. The origin, location, and geol. formation of these 2 kinds of shale are discussed in detail. The clay shale has d. 2.18 and yields 4-5% of oil. The distn. products of Baltic port, Reval, and Ontika shales contain, resp.: C 72.78, 69.02, 58.28; H 7.44, 7.17, 5.32; O 17.16, 21.23, 34.40; N 2.62, 2.57, 2.00%. There is an increase of hydrocarbons as well as of N as the samples are taken from more westerly directions. The N content is high as compared to the 0.22-0.24% content of the German shale. The Kukersite is a light brown, yellowish and often a bright and dark flecked burning shale of d. 1.2-1.6. Its bitumen content runs from 42 to 50% and samples have been known to contain as much as 75%. Low-temp. distn. (480-500°) gave for 1 kg., 100 l. of gas while higher temps. gave 275 l. The low temp. also gave a higher yield of oils. For all grades of this shale, drying gave more satisfactory distn. products; 15-16% of oil may be obtained from it. The clay shale is inferior in both yield of oil and heat units to the German shales. The Kukersite compares favorably with the best Scottish shales, but contains more S. The use of shale for direct burning on the grate and for retorting is discussed. In retorting shale the low temp. limits are about 300-360° as compared to 400-600° for low temp. carbonization of coal. Distn. results are given for a ton of Kukersite, dried to about 1% moisture from 13.7%, and heated to 650° in a horizontal retort. D. F. BROWN

Oil-shale unsaturates. C. W. BOTKIN AND R. W. BOYD. *Petr. Age* 10, No. 11, 78-85(1922).—Expts. were conducted to det. unsatn. by iodometric methods. The Hanus method gives a lower I no. when the excess of I is small and a higher no. when the excess of I is larger than is obtained by the Hübl method. The I nos. are less affected in the latter method by an excess of I than the Hanus numbers. With large excess of I neither method is reliable. The Hübl-Waller soln. gives more nearly const. results with varying excesses and is, therefore, more desirable for the detn. of the I no. of shale oils. The Hanus soln. is apparently better fitted for the detection of diolefins by Faragher's method. Diolefins are present in the light fractions and probably in the heavy fractions of once run oil. The light, acid-sol. oil formed by the decompn. of the crude shale oils is satd. The I no. of the crude oil is only slightly higher than that of the once run oil, yet the H_2SO_4 absorption of the crude oil is much greater. The light fraction with an I no. 2.5 times that of the heavy fraction has a H_2SO_4 absorption only 0.75 times that of the heavy fraction. D. F. BROWN

Natural gasoline in motor fuels. O. P. KEENEY. *Oil & Gas J.* 21, No. 28, 64-6 (1922).—U. S. natural gasoline production increased 400% from 1916 to 1921 and its ratio to total production from 5% to 10% in 1921. D. F. BROWN

Specification changes in natural gasoline and blends are approved. ANON. *Nat. Petroleum News* 14, No. 49, 22(1922).—The following specifications have been adopted by the Assoc. of Nat. Gasoline Mfrs.

Grade.	Natural Gasoline.				Motor Natural Gasoline—Blends.			
	A.	B.	C.	D.	1.	2.	3.	4.
Bé. gravity min.	72	76	80	88	58	58	64	66
max.	78	82	88	92	62	62	66	70
End point max.	375° F	375° F	350° F	350° F	437° F	450° F	440° F	435° F
Recovery min.	90%	88%	78%	—	91%	90%	88%	85%

Color must be water white by Saybolt chromometer. Temp. condensates shall be 55-65° F. All tests to be made by A. S. T. M. methods. D. F. BROWN

Properties of crude oils. J. B. RAMBUN. *Petroleum Age* 10, No. 11, 37-9 (1922).—Compilation from Bur. Mines and other data of the physical properties, including distn. tests and analytical data, for Texas, Okla., Kansas and La. crude oils. Cf. C. A. 17, 205. D. F. BROWN

Mexican vs. Mid-Continent gas oils. R. B. HARPER. *Refiner* 1, No. 3, 9-11 (1922).—The oils are compared on the basis of: contribution to total heating value per gal. gas oil per million cu. ft. gas made, contribution to S content of the crude gas by the oil, deposition of C on checkerboard of gas machine by the oil and conditions affecting the handling of the oil. The conclusions are: that Mexican gas oil would have to be shipped in steam coil tank cars in cold weather; it contributes 8,000 more B. t. u. per gal. than Mid-Continent oil; gives relatively no C deposits as compared to other gas oils; gives no noticeable difference in yield of tar; gives 50% increase of H₂S content compared to gas made using Mid-Continent gas oil; yields more gas per gal. and produces a gas of equal stability as gas from Mid-Continent oil. Admission is made that the Mid-Continent oil used was not as good as reasonably obtainable. D. F. BROWN

Paraffin oxidation. H. SIMBENECK. *Petroleum Z.* 18, 1193-96 (1922).—Brown-coal paraffin, m. 54°, from generator tar was treated at 13° for 55 hrs. with gas from a cylinder contg. O 94.9 and N 5.1%. Analyses are given of the products at 4, 8, 12, 16, 20, 22, 33, 44, and 55 hr. periods. In the first there is a rapid absorption of O within the first 10 hrs. accompanied by the formation of formic and other acids of low mol. wt. Ester formation is the primary reaction, the acids being secondary products resulting from the ester decompu. A second phase is reached after 12 hrs. when CO₂ is evolved. The O content of the material decreases between 12 and 16 hrs. from 9.39 to 2.94% while the acid number increases more than 100%. A third phase occurs after 33 hrs. when the ester no. begins to decrease. The products formed in the second phase have the greatest practical value. They are waxy, of bright color and can be recovered by steam distn. D. F. BROWN

Producing naphtha from heavier distillates. J. V. MEIGS AND E. J. FORD. *Refiner* 1, No. 3, 7-8 (1922).—The process described refers to a method for breaking down heavier hydrocarbons by passing a so-called "silent elec. discharge" through the vapors mixed with methane (natural gas) or H. D. F. BROWN

Comparison of paraffin and asphalt lubricating oils. F. N. WILLIAMS. *Refiner* 1, No. 3, 13 (1922).—A comparison is made of the various properties starting with two oils of equal viscosity at 100° F., 361 sec. Saybolt Universal. The extreme difference exists in the change of viscosity over certain temp. ranges. From 70° to 100° F. the change in asphalt base oil is 1427 sec. as compared to 620 sec. for paraffin base oil but from 100° to 212° F. the changes are 312 and 309 sec., resp. This shows that over the range of normal operation that there is practically no difference as far as viscosity is concerned. The pour points 20° F. and 40° F., resp., show a decided advantage for the asphalt base where the production of low "cold test" oils is desired. The Conradson carbon test gave 0.063% and 0.130% C, resp., with the C residues from the detns. "soft and flaky" and "hard and gritty," resp. It is pointed out that C produced from the asphalt base oil would undoubtedly be easier to remove and would probably cause little scoring of cylinder walls. D. F. BROWN

Cracking petroleum oils. J. H. ADAMS. U. S. 1,433,519, Oct. 24. Oil under treatment is continuously passed under pressure through a series of heating chambers in each of which vapor pressure is maintained and from each of which vapors are with-

drawn to a condenser which is also maintained under pressure. This pat. is based upon an application filed Dec. 1, 1909.

Cracking hydrocarbon oils. J. L. MURRIE. U. S. 1,435,652, Nov. 14. Hydrocarbon oil from crude petroleum, shale or gilsonite is introduced into the lower part of a molten metal bath together with a permanent gas such as natural gas and the resulting gases and vapors are led from the upper part of the retort contg. the molten metal to a condenser while a layer of heavy fractions and unvaporized hydrocarbons is continuously supplied to the surface of the molten metal, holding C impurities in suspension. The thickness or depth of this layer is adjusted as required.

Cracking hydrocarbon oils. C. L. LIGHTENHOLME. U. S. 1,434,300, Oct. 31. Relatively heavy hydrocarbon oils, such as kerosene of 44.5 B \bar{e} , are subjected to the action of lime and steam in finely divided condition at a temp. and pressure which cause the formation of permanent gases and lighter condensable hydrocarbon oil.

Refining liquid hydrocarbons containing sulfur. A. E. DUNSTAN. U. S. 1,435,824, Nov. 14. Kerosene, shale oil or other liquid hydrocarbon material contg. S is treated with an alkali hypochlorite soln. to oxidize the S.

Distilling mineral oils fractionally while still in wells. W. J. KNOX. U. S. 1,433,956, Oct. 31. Oil is withdrawn from a well and after being heated is reinjected into the well at a sufficiently high temp. to volatilize a fraction of the oil of low b. p. in the well. Vapor thus generated is withdrawn from the well and condensed.

23—CELLULOSE AND PAPER

CLARENCE J. WEST

The tinting of white papers. W. C. HOLMES. *Color Trade J.* 11, 206-9 (1922).—A discussion of the dyes used to tint various grades of paper, mordants used, and the characteristics of some basic dyes. CHAS. E. MULLIN

Cellulose ether solution. S. J. CARROLL. U. S. 1,434,426, Nov. 7. Viscous solns. adapted for making films or molded articles are prepd. from cellulose ethyl ether 20, dissolved in a mixt. of PhOH 90-50 and MeOH or EtOH 10-50 parts. U. S. 1,434,427 specifies a similar compn. in which C₂HCl₃ is used instead of PhOH.

Cellulose ether solution. W. R. WEBB. U. S. 1,434,465, Nov. 7. A flowable compn. adapted for making films or molded articles is formed from cellulose ethyl ether dissolved in a mixt. of CCl₄ 75% and EtOAc 25%. Cf. C. A. 16, 2780.

Cellulose ether solution. J. M. DONOHUE. U. S. 1,434,432, Nov. 7. A viscous soln. adapted for making films is formed of ethyl cellulose dissolved in a mixt. of equal amts. of CCl₄ and C₄H₆.

Solvent for cellulose acetate. V. B. SEASE. U. S. 1,434,634, Nov. 7. A mixt. adapted for making cinematographic films is formed of acetone 65-80, EtOAc 25-15, cellulose acetate sol. in hot C₄H₆-alc. and in hot aq. alc. 23 parts, a softener such as camphor or a camphor substitute and an acetone condensation product comprizing mesityl oxide or diacetone alc. 10-5 parts.

Viscose solutions for films or threads. W. O. MITSCHERLING. U. S. 1,435,650, Nov. 14. Soda cellulose is treated with CS₂ to form cellulose xanthate without aging the soda cellulose, using only about 30-32% as much CS₂ as cellulose. The reaction is carried out at a temp. of about 20° hut without refrigeration and the cellulose xanthate, without aging, is dissolved in an alk. solvent contg. such an amt. of NaOH that the total amt. of NaOH is 100-102% the wt. of the cellulose. Solns. thus prepd. are suitable for the manuf. of films, filaments or threads.

Bleaching paper pulp. R. B. WOLF. U. S. 1,433,865, Oct. 31. The pulp is

mixed with a bleaching agent, e. g., a Cl soln., and agitated at intervals as it is conveyed (for the most of the time without agitation) through a treating chamber or app.

Sizing for paper. J. H. RYAN. U. S. 1,434,227, Oct. 31. A thin doughy mixt. is formed of satin white, clay and H_2O , ground in a pebble mill, mixed with a usual sizing soln., which may contain casein glue or hydrated starch, and the mixt. is further ground together to eliminate all grit. Cf. C. A. 16, 1666.

24—EXPLOSIVES AND EXPLOSIONS

CHARLES E. MUNROE

Ozone and microresearch of explosives. GEORGE-MARIA SCHWAB. *Umschau* 1922, 538-9.—A speculative article rehearsing the history and properties of ozone and its isomers, autozone and oxozone. A mixt. of liquid H and solid O_3 forms a very powerful explosive. Microchemical study of these substances is advocated and some examples of such studies are given.

CHARLES E. MUNROE

Tetryl: its properties, manufacture and tests. L. DESVERGNES. *Mem. poudres* 19, 217-68 (1922).—Largely a discussion of results from numerous unpublished papers, including reports of the École Central de Pyrotechnie, Laboratoire Central des Poudres, and French powder factories at Esquerdes, Bouchet, Sevran-Livry and Saint-Fons. Pure tetryl m. 129-30°. A tabulation and curves show soly. in varying strengths of HNO_3 from 25° Bé. to 48° Bé. at temps. from 15° to 95°. Calcd. explosive characteristics and results of physical tests of tetryl are shown in comparison with values for other high explosives. These tests include pressure, rate of detonation, ballistic mortar, sensitiveness to friction, impact, and detonation, ignition temp. and Trauzl test. Four processes for the manuf. of *dimethylaniline* are described in detail; the catalytic method is of special interest. Aniline and MeOH are passed repeatedly over Al_2O_3 at a temp. of 275°; the final product contains 87.5% dimethylaniline (DMA), 10% monomethyl aniline and 1% aniline. Detailed methods for test of DMA are given. Six processes for manuf. of tetryl are described: the 1-stage and 2-stage methods of Koehler, including a continuous process, the methods of Brunel and Van Duin, and the English and German methods. The 1-stage method of Koehler is the most economical as regards consumption of raw materials and gives as good yield (90-98% of theory) of high-grade tetryl as other methods. In the continuous process, the sulfated DMA and mixed acid (52% H_2SO_4 , 27% HNO_3 , 21% H_2O) are mixed at 20°, and flow into the bottom of a lead-lined jacketed nitrator contg. spent acid at 90°-92°. The temp. is held at 92°-94° with agitation; the mixt. gradually overflows into another vessel where it is cooled to 25°, thence to a filter. Purification of tetryl by recrystn. from (a) C_6H_6 and (b) HNO_3 is described in detail. In the latter process difficulty was encountered in removing occluded acidity from the crystals of tetryl. Digestion for 30 min. with 5% soln. of Na_2CO_3 at 80°-85° removed this acidity. Long exposure to temps. of 100°-130° causes gradual decompn. 600 hrs. at 100° reduced the m. p. from 128.5° to 71°; 500 hrs. at 125°-130° gave a similar reduction to 41° and 500 hrs. at 100° followed by 100 hrs. at 110° caused a reduction in m. p. to 21°. The latter heated sample also showed a drop in N from 24.0% to 20.86%. A sample heated 200 hrs. at 110° m. 122.9°, and contained 8.07% sol. in EtOH; the sol. portion m. 28° and contained 21.6% N. The gas evolved on heating *in vacuo* consists of CO_2 , CO and N; no oxides of N were found. The residue contains 61% trinitrophenol and 32% unchanged tetryl. Low m. p. mixtures of tetryl and TNT were studied. A tabulation shows m. p. and explosion pressure ($\Delta = 0.25$) for a series of mixts. varying from 100% TNT to 100% tetryl. An 80/20 mixt. has the lowest m. p. of 59.5°, a 20/80 mixt. 72.5°.

C. G. STORM

The hygroscopicity of tetryl and tetranitraniline. L. G. MARSH. *Chem. Met.*

Eng. 27, 1261-2(1922).—The results obtained by the method used by Taylor and Cope (*C. A.* 10, 2799) and by Huff (*C. A.* 14, 347) show that both pure tetryl and TNA are non-hygroscopic while the commercial products are slightly hygroscopic according to the impurities present.

CHARLES E. MUNROE

Trinitroanisole and trinitrophenetole: properties, manufacture, and tests. L. DESVERGUES. *Mem. poudres* 19, 269-99(1922).—A bibliography lists 19 papers on the subject, practically all of which are unpublished reports from French Govt. laboratories. The paper is mainly a digest of results from these reports. Lab. tests were made of a direct process of nitration of anisole as carried on at Cahours and later at the Bayer factory in Germany. Anisole was prepd. by methylation of phenol with Me_2SO_4 or MeHSO_4 . A yield of 85% of theory was obtained; the trinitroanisole (A) m. 65° . The process is complicated and costly, the intermediate prepn. of dinitroanisole (B) being preferred. Several methods are described for the prepn. of B. In general $\text{C}_6\text{H}_4\text{Cl}(\text{NO}_2)_2$ and MeOH are heated at $50-55^\circ$ with an excess of NaOH for about 30 min. Yield of B is about 90-95%. CaO may be substituted for the NaOH if the mixt. is heated at 66° for 4 hrs. with a reflux condenser. B is nitrated to A by means of mixed acid at a temp. of $35-40^\circ$, with a yield as high as 93%, the product is washed several times with water at 90° and finally dried by the aid of a vacuum. Iron vessels are not used in washing, as the metal in the presence of traces of acid forms reduction products which lower the m. p. Trinitrophenetole (C) is prepd. by nitration of dinitrophenetole, which is made by a method analogous to that described for B. Exact control of nitration temp. is necessary in order to avoid either decompn. or incomplete nitration. Poor yields, especially at high temp., indicated decompn., and examn. of the product showed the presence of a substance m. about 120° , whose NH_4 salt formed red crystals, and which is thought to be identical with the isopieric acid studied by Nietzki. A was used by Germany mixed with $[(\text{NO}_2)_3\text{C}_6\text{H}_2]_2\text{S}$ in bombs, and was tested for similar use in France. C has been known since 1866 but has not been used as an explosive. A mixt. of either with 40% NH_4NO_3 melts on the water bath, is a stronger explosive than Melinite DD 60/40, relatively insensitive to shock and gives good fragmentation test when used as a bursting charge in shell. Both A and C are much less sensitive to shocks than Melinite D: rates of detonation are, A 7640, C 6880, TNT 6880 m. per sec. Both A and C when tested as booster charges in 75 mm. shell loaded with Schneiderite gave results equal to TNT. A is rapidly, C slowly, converted to picric acid by action of H_2O ; at 40° in 1 month A yielded 17.28%, C 2.43% picric acid. C. G. STORM

The propagation of explosion waves in gases contained in tubes of varying cross-section. COLIN CAMPBELL. *J. Chem. Soc.* 121, 2483-98(1922).—The velocity of the detonation wave in any given gaseous mixt. (1) is independent of the material composing the tube, (2) is affected by a flexible junction between two tubes, the flame being damped down at the junction and taking some time to recover its original speed, (3) remains practically const. for rapid mixts. in tubes of different diams. but the rates are considerably different for slow mixts. and (4) when a detonation wave meets the closed end of a tube a wave of compression, having a velocity approx. equal to that of sound under the same conditions, is reflected back through the burning gases. The systems of tubes used in this research were (1) "normal-narrow," (2) "normal-wide," (3) "normal-narrow-normal," (4) "normal-wide-normal." A "normal tube" is one in which the diam. is sufficient, but not greatly in excess of that required, to allow the detonation wave, travelling in any particular mixt. to assume its max. velocity. With different mixts. tubes 10-16 mm. diam. satisfied the conditions for a "normal" tube. The movements of the flames were recorded and analyzed photographically. With binary mixts. of H_2 , CS_2 or C_2N_2 , in varying proportions, with O an explosion wave does not change its velocity appreciably when it passes into a narrow tube, whether this narrow tube is

closed at the further end or whether it opens again into a wider tube. The distance over which this flame can travel will probably depend on the material of the tube, but very narrow glass tubes (about 2 mm. in diam.) will allow the flame in the mixt. $2\text{H}_2 + 3\text{O}_2$ to travel at least 40 cm. without appreciable retardation. An explosion flame is suddenly retarded at any point where a sudden expansion of hot gases may occur. In some gaseous mixts., this flame then moves at a fairly const. velocity for some distance; in others, it continues to be retarded. Probably it finally gains speed and reproduces the detonation wave. The retardation of a detonation wave as it passes through a flexible joint between 2 rigid tubes is probably due to a sudden expansion at the junction. Where the joint is smooth and rigid and the tubes are of equal diam., no expansion occurs, and therefore no retardation takes place. The retarded flame is preceded by a compression wave, more or less rapid according as the expansion has been small or great, and this, after collision with the closed end of the tube, is reflected and checks the advancing flame. The rates of the retarded flame and of the preceding pressure-wave are dependent on the gaseous mixt., the relative sizes of the different portions of the tube, and possibly the initial pressure. The greater the difference between the diams. of the 2 portions of the contg. tube, the less the velocities of the retarded flame and of the preceding pressure-wave in any one mixt. These velocities reach a lower limit in a very wide tube.

CHARLES E. MUNROE

Limits for the propagation of flame in vapor-air mixtures. II. Mixtures of more than one vapor and air at ordinary temperature and pressure. A. G. WHITE. *J. Chem. Soc.* 121, 2561-77 (1922); cf. *C. A.* 16, 3396.—In a limit mixt. the heat given out by the burning gas mixt. is sufficient, and only sufficient, to enable propagation of flame to take place. It is reasonable to assume that when two or more similar limit mixts. contg. different combustibles are mixed the mixt. would always be the limit mixt. If n_1, n_2, n_3, \dots are the percentages of different combustibles in the limit mixt. and N_1, N_2, N_3, \dots are the percentages of the same combustibles required to give limit mixts. when each is separately mixed with air, then the vol. of the final mixt. is given by the sum of a series of terms $100 n_1/N_1, 100 n_2/N_2, 100 n_3/N_3, \dots$ and is equal to 100. Thus $n_1/N_1, n_2/N_2, n_3/N_3, \dots$ equals 1. This is the generalized form of Le Chatelier's formula for binary combustible gas-air mixts. W. has experimentally tested it for more complex mixts. using C_2H_6 , C_2H_4 , C_2H_2 air; Me_2CO - MeEtCO -air; Et_2O - Me_2CO -air; Et_2O - EtOH -air; Et_2O - AcH -air; Et_2O - CS_2 -air; and CS_2 with Me_2CO or C_2H_6 or AcH and air, detg. the range of flame propagation in various directions, the limit mixts. and in some instances the relative calorific values. For all mixts. of 2 combustible vapors and air, except CS_2 , the propagation of flame at the lower limit for all directions, and at the upper limit for downward propagation, the results agreed well with those calcd. from Le Chatelier's formula. Good agreement was obtained throughout in the case of $\text{C}_2\text{H}_6 + \text{C}_2\text{H}_4$ mixts. but those contg. Me_2CO appeared to be affected by the anomalous behavior observed in this compd. alone. In no case did Le Chatelier's rule hold for any direction in which one of the two vapors under examn. could propagate a cool flame. When the second vapor gave no cool flame under these conditions, the propagation of a cool flame in the mixt. appeared to be hindered by the presence of the second vapor. Some vapors were more effective than others in thus hampering cool-flame propagation. By the addition of a vapor giving no cool flame to Et_2O -air, it was possible to divide the mixt.-air propagation range into two, a cool and a normal range, even for upward propagation. Mixts. contg. CS_2 gave results differing considerably from those calcd. from Le Chatelier's formula. For mixts. which did not contain too much CS_2 , the calorific value of the amt. of vapor required to give a lower-limit mixt. was always much the same. For reasons given, however, it was decided that ordinary propagation in CS_2 -air was probably catalyzed, presumably by some product of the combustion, but that this catalytic

process was inhibited by such vapors as C_6H_6 , Et_2O , Me_2CO , and AcH , although apparently unaffected by small quantities of CO_2 and CCl_4 , and little affected by certain combustible gases. The uncatalyzed limits for downward propagation in CS_2 -air would appear to be about 4.0% and 12%, values agreeing fairly well with the calorific value rule put forward in Part I. The catalytic character assumed for the combustion process appears to go some length towards explaining the relative values found for the upward and downward limits for propagation in the case of this compd. Further work is now in progress on the phenomena observed with CS_2 . CHARLES E. MUNROE

Fatal explosion at Columbia. ANON. *Chem. Met. Eng.* 27, 1044(1922).—While students were engaged in the manuf. of Ph_2NH by beating $PhNH_3$ and $PhNH_2Cl$ at $240-260^\circ$ for 24 hrs. in an autoclave the latter exploded, killing one and seriously injuring another graduate student. Just before the explosion the gage showed a sudden rise in pressure of from 112 to 250 lbs. per sq. in.; it is held that the flame with which the autoclave was heated ignited escaping gases and shot back into the autoclave.

CHARLES E. MUNROE

Accident in using explosives. C. A. OLSSON. *Rept. Inspector of Explosives*, Sweden, mimeographed 6 pp. (August 20, 1918).—An accident in using liquid-air explosives was apparently due to the use of a wooden loading bar having rags nailed to the end. An obstruction was encountered in the horizontal hole and considerable force employed in inserting the cartridges, some of which were crushed and the lampblack dust with the escaping liquid oxygen ignited by friction of the nail on the work tip of the loading bar. About 35 to 40 kg. of explosive had been loaded when the explosion took place. A flame was noticed at the mouth of the borehole immediately preceding the explosion. The possibility of glowing fuse remains from the springing operation is eliminated because 48 hrs. passed between springing and loading. The more remote possibility of ignition by friction of loose rock particles along the walls of the borehole is mentioned. E. M. SYMMES

Dry lime-sulfur and sulfur dust explosions. P. W. EDWARDS. *Chem. Met. Eng.* 27, 986-9(1922).—Accounts of fires and explosions occurring in an insecticide plant are given. The material, consisting of Ca polysulfide 75, CaS_2O_5 5, S 8 and inert matter 12% was blown in fine dry dust into bag collectors. 75 mg. of this mixt. generated a pressure of 5.7 lb. per sq. in. when ignited in a 1500-cc. flask; its ignition point was between 275° and 300° . Some of the fires were attributed to particles of burning oil or C from the combustion chamber but the fire accompanied by explosion occurred in the dust collector and is attributed to static charges. This is also assigned as the cause of a serious explosion of powdered S in the grinding section of a chemical plant. Exptl. data on the accumulation of static in dust collectors under varying conditions of grounding are given. CHARLES E. MUNROE

Tests on the inflammability of dust from liquid air explosives. NAUCKHOFF and KRANTZ. *Rept. Inspector Explosives*, Sweden, mimeographed 2 pp. (August 20, 1918).—An iron pipe $3/4$ m. long by 2 in. diam. was closed at one end and buried vertically in the ground. Liquid oxygen was poured in and the contents of an unimpregnated lamp-black cartridge were shaken in. The pipe was immediately closed by a wooden plug and the contents were ignited by a spark passing between two insulated wires in the interior. Explosion was obtained on the first trial. Since this spark was comparatively large, the test was repeated with a very small induction coil. Repeated trials gave no explosion. A third series was run in which the contents of a cartridge satd. with liquid O were used to form the gas-dust mixt. Ignition was obtained in some cases. Sparks from shock and friction could also cause ignition. E. M. SYMMES

Chemical analysis of Cheddite. M. GUA. *Z. ges. Schiess-Sprengstoffw.* 17, 137-9(1922).—The basic material of the Cheddites may be either chlorate ($KClO_3$) or

NaClO_4) or perchlorate (NH_4ClO_4 or KClO_4). Both types contain aromatic nitro compds. and a fatty material as a binder (castor oil, vaseline, paraffin, etc.). Chlorates are detected by heating 0.2-0.3 g. in a test-tube over a flame and testing for evolution of O by means of a glowing splinter. Binding material is detected in the Et_2O ext. by evapg. and removing nitro compds. from the residue by means of cold 10% NaOH. Aromatic nitro compds. are detected in the Et_2O ext. Picric acid gives a yellow color to the H_2O soln. 2.5%-25% NaOH soln. gives evolution of NH_3 and red-brown color on heating with trinitro derivs. of benzene, toluene, xylene or naphthalene with nitro groups in *m*-position to each other. This reaction is given either not at all or only in a slight degree by mono- and dinitro compds. For quant. analysis a 10-g. sample is extd. with Et_2O in a Soxhlet app. for 6-7 hrs., the soln. evapg. and the residue dried 3-4 hrs. at 60° , then 12 hrs. over H_2SO_4 , giving total nitro compds. and binding material. The N content of the nitro compd. is detd. by Williams' modification of the Kjeldahl method. Chlorates or perchlorates in the H_2O ext. are detd. by the nitron pptn. method. Examples of results of analyses show the accuracy of the method. C. G. STORM

Determination of viscosity of poudre B paste. ANON. *Mem. poudres* 19, 146-53 (1922).—To det. the degree of uniformity in the plasticity of pastes (colloids) of *smokeless powder* (poudre B), from different mixer charges in the factory, a sample is placed at once in a hermetically sealed glass container. The app. for the test consists of a metal cylinder through whose cover is passed a round metal rod 10 mm. in diam. held vertically, with a clamping device for holding the rod at a desired height. The sample of paste is transferred to the cylinder, pressed into a block by means of a plunger, and the rod then inserted so as to rest on the surface of the block. The rod is then clamped in this position and its length projecting above the cover is measured to 1 mm. A perforated wt. of 2 kg. is placed on the upper end of the rod and the clamp released for exactly 1 min., at the end of which time the projecting portion of the rod is again measured. The difference between the two measurements is the depth to which the weighted rod has sunk into the block of colloid, and is designated as the *coeff. of plasticity* of the paste. The method is accurate within 5%. Uniformity in plasticity of successive mixer charges is essential for the manuf. of a uniform product. C. G. STORM

Fire hazards at quenching tanks. ANON. *Chem. Met. Eng.* 26, 1220(1922).—A review of the rept. on "Regulations for Use of Volatiles in Manufacturing Processes" made by the comm. on mfg. risks and special hazards to the National Fire Protection Assn. It deals especially with *dip tanks* contg. highly volatile inflammable materials subject to flashing at ordinary temps., such as naphtha, benzene, C_6H_6 , amyl acetate, CS_2 , alc., paints contg. turpentine, and tempering oils. Mfg. requirements in industries, such as the automobile, demand large tanks; as many as 3 or 4, each of 10,000 gals. capacity, are in a single room. The fire hazard in dipping rooms is extreme since ordinary means of extinction do not operate with success on such fires. Provision for overflow should be made and also ventilation to the outside air to prevent dangerous concns. of inflammable vapors from accumulating. The regulations recommended are given.

CHARLES E. MUNROE

Explosive. T. L. DAVIS. U. S. 1,432,321, Oct. 17. An explosive adapted for use in guns as a smokeless powder is formed of pentaerythrite tetranitrate, pentaerythrite tetrahenzoate and pentaerythrite cinnamate.

Coating smokeless powder. T. L. DAVIS. U. S. 1,432,322, Oct. 17. Grains of nitrocellulose smokeless powder are coated with a heterocyclic N compd., *e. g.*, diphenylpyrazolone or a similar substituted pyrazolone or substituted pyrazolidone.

Incendiary shell. J. H. HAMMOND, JR. U. S. 1,435,228, Nov. 14. A charge of Fe oxide and Al or similar "aluminothermic" material in the shell is ignited by a BaO_2 and Al mixt. fired by a concussion fuse.

Incendiary projectile. W. L. CLAY and A. H. HALLOWELL. U. S. 1,434,681, Nov. 7. Structural features.

"Headless" matches. S. HATAKEYAMA. U. S. 1,434,893, Nov. 7. Splints for making matches are hoiled in an aq. KClO_4 soln. and after drying their tips are impregnated with an aq. soln. of $\text{Ba}(\text{ClO}_4)_2$ and dextrin.

Nitroglycerin explosive. C. A. WOODBURY. U. S. 1,434,642, Nov. 7. An explosive adapted for blasting is formed of nitroglycerin 6.5-40, NH_4ClO_4 10-35, and wood pulp or similar carbonaceous material 8-25 parts, with or without other usual dynamite ingredients. The use of perchlorate lessens sensitiveness to shocks.

Non-fuming phosphorus composition. S. S. SADLER. U. S. 1,433,100, Oct. 24. P is mixed with an org. base of high b. p. such as α -naphthylamine and dimethylaniline in order to form a mixt. adapted for use in match or pyrotechnic compns.

25—DYES AND TEXTILE CHEMISTRY

L. A. OLNEY

Suggestions towards a research policy. H. H. HODGSON. *J. Soc. Dyers Colourists* 38, 215-21 (1922).—Urging a definite research policy in England. CHAS. E. MULLIN

Progress in dye chemistry in 1921. F. MAYER. *Chem.-Ztg.* 46, 977-80, 983-4, 997-8, 1026-7 (1922).—A review with literature references. E. H.

Health in the dye industry. H. J. CONN. *Nation's Health* 4, 726 (1922).

E. J. C.

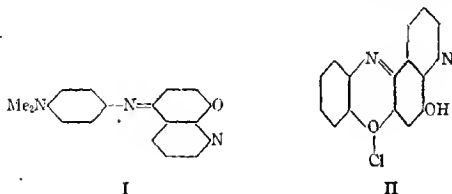
"The whole art of dyeing." Some notes on an eighteenth century treatise. J. F. CORRIGAN. *J. Soc. Dyers Colourists* 38, 222-4 (1922). CHAS. E. MULLIN

New dyes and sample cards. P. KRAIS. *Z. angew. Chem.* 35, 666-7 (1922).

E. J. C.

Mordant dyes. E. NOELTING. *Chimie et industrie* 8, 753-61 (1922).—8-Hydroxy-quinolines (A), colorless in themselves, dissolve to yellow soln. in alkalies and are fixed by metallic mordants, giving yellow with Al and gray with Fe (E. Noelting and E. Trautmann, *Bull. soc. chim.* [3] 5, 220 (1891)). Derivs. retaining the free OH in the same position behave as dyes; but those in which it is destroyed or removed to another position do not. 5-Phenylazo-8-hydroxy-7-methylquinoline, orange-red needles from dil. $\text{C}_6\text{H}_5\text{N}$, m. 174° , sol. in alkalies, dyes orange with Al mordant and brown with Fe mordant. Owing to the basicity of the quinoline group it dyes tannin-mordanted cotton orange-brown. 8-(2-Hydroxy-1-naphthylazo)quinoline, red needles, insol. in water, sol. in alc., C_6H_6 , and $\text{C}_6\text{H}_5\text{N}$, m. 225° , is fixed by tannin, but not by metallic mordants. The indophenol of A, (I) (from 5 g. of nitrosodimethylaniline in 250 cc. of slightly acidified water reduced at 45° with 5 g. of Zn dust, cooled, and treated with 6 g. of A, 6 g. of NaOH and 5 g. of $\text{K}_2\text{Cr}_2\text{O}_7$ in 1 l. of water, pptd. after a few hrs. with AcOH, filtered, dissolved in excess of AcOH, reprecip. with NH_4OH , and crystd. from C_6H_6) blue powder with no definite m. p., insol. in water, easily sol. (violet-red) in C_6H_6 , and easily sol. (blue) in alc., Et₂O and $\text{C}_6\text{H}_5\text{N}$, sol. in acids, sol. in alkalies only in the presence of reducing agents when it forms a vat in which cotton can be dyed blue. In AcOH it dyes cotton reddish brown or green turning to blue with Na_2CO_3 . It is not fixed by mordants. $\text{HOC}_6\text{H}_4\text{NMe}_2\text{HCl}$ and A, in alc. soln. in the presence of a trace of Zn dust, give II, a blue compd. which dyes tannin-mordanted cotton blue and is fixed by Fe, Al, and Cr mordants. The similar thio deriv., obtained by oxidizing 2,5- $\text{H}_2\text{N}(\text{Me}_2\text{N})\text{-C}_6\text{H}_3\text{.SSO}_2\text{H}$ with A, has similar properties but is more strongly fixed by mordants. Bis(8-hydroxyquinolyl)methane (from 2 mols. A in hot alc. and 1 mol. of CH_3O in the presence of HCl, after several hrs. poured into water, neutralized, filtered, unchanged A removed with boiling water, crystallized from boiling C_6H_6), small yellowish white

grains without definite m. p. but decomposed above 200°, insol. in water and ligroin, easily sol. in alc., CS_2 , $\text{C}_6\text{H}_6\text{N}$, less easily in C_6H_6 and with yellow color in both acids and alkalis. It dyes mordants much more intensely than A. A can be condensed with Wiebler's ketone in the presence of P oxychloride, giving $\text{HOC}_6\text{H}_4\text{NC}(\text{C}_6\text{H}_4\text{NMe}_2)_2$: $\text{C}_6\text{H}_4\text{NMe}_2\text{Cl}$, a dye similar to *p*-hydroxymalachite green and especially to the α -naphthol blue studied by N. and Saas. The hydrochloride dyes silk, wool and cotton green, which turns blue with alkalis. The base dyes directly blue, and dyes metallic mordants blue. Condensation of Wiebler's ketone with ethyl-A gives a dye with OR instead of OH, which does not dye metallic mordants but behaves as a quinoline deriv. and dyes green. *Dimethyl- and diethyl-m-amino-o-nitrosophenol* on Scheurer strips form various colored lakes, e. g., red with Co, and brown with Bi, Ti and U. With Fe it gives brown instead of green like the other *o*-nitroso compds. *Nitrosomethylphenylpyrazolone* gives browns with Fe and Cr, yellowish brown with Bi, reddish brown with Co and U, green with Cu, but no color with Al. *3-Nitroso-2,4-dihydroxyquinoline* gives gray with Cr, blackish blue with Fe, blue with Y and Ce, brownish orange with Co, but no color with Al. It is the only nitroso known to N. which gives blue lakes.



A. P.-C.

The constitution of pigment chlorine GG (M.L.B.) and of lithol fast yellow GG (B.A.S.F.). P. M. ROWE AND ESTHER LEVIN. *J. Soc. Dyers Colourists* **38**, 203-4 (1922).—Expts. prove that the statements in the literature with regard to the constitution of these colors are incorrect; that pigment chlorine GG is a condensation product from 3-chloro-6-nitroaniline and HCOH; and that lithol fast yellow GG is the condensation product from 4-chloro-6-nitroaniline and HCOH. CHAS. E. MULLIN

Poisonousness of tar dyestuffs. F. S. HUBER. *Textile Colourist* **44**, 703-4 (1922).—Several lists of dyes with their physiol. actions are given. CHAS. E. MULLIN

Removal of naphthylamine bordeaux. JOS. POKORNY. Sealed Note No. 2195 of July 29, 1912; *Bull. soc. ind. Mulhouse* **88**, 331 (1922).—Fabric dyed with α -naphthylamine bordeaux is printed with the following mixt.: 200 g. of NaClO_2 , 50 g. of $\text{K}_4\text{Fe}(\text{CN})_6$, 100 g. of citric acid, 50 g. of leucotrope O (BASF), 550 g. of thickener. It is then steamed, passed through NaOH (like indigo), and washed with soap. *p*-Nitroaniline red can be similarly removed (but the resulting white is not entirely satisfactory), and also Mn bister. The use of the leucotrope allows of more satisfactory removal of colors which were formerly removed with chlorate-ferrocyanide. Leucotrope W was also tried out. Report by Henri Bourry. *Ibid* 332.—The addition of the leucotrope improves the results obtained with the chlorate-ferrocyanide mixt. on α -naphthylamine garnet, and has not been mentioned in previous publications. The whites obtained are not entirely satisfactory and cannot compare with those obtained by means of formaldehyde-sulfoxylate. The action on *p*-nitroaniline red and on Mn bister is very imperfect. The method possesses historical interest, and may ultimately be useful in certain special cases. A. P.-C.

Dyeing cotton fabrics by means of logwood. H. SUNDER. *Chimie et industrie* **8**, 762-6 (1922).—Previous methods are discussed. The new method is: Boil the goods

(preferably with acid) to remove the dressing, "tan" with sumac (6-8% dry ext., 12-16% of 25° Bé. ext., or 15-20% of 20° Bé. ext.), mordant with a Cu-Al-Cr bath of 6° Bé., using 80 l. per 100 kg. of goods, wash, put through an alk. bath (Na_2CO_3 or preferably 5-6% of NaOH on the wt. of the goods), wash and dye on a jigger twice at about 50° and 8-10 times at the b. p. As the color obtained with logwood alone is neither sufficiently bright nor sufficiently fast to soap, it is mixed with one or more gallocyanin colors, those most used being chromophenine FKN, modern violet (or ultra Mo. violet), modern blue CVI, chromacotin blue S. After dyeing wash thoroughly and dry. The subsequent dressing has practically no effect on the color thus produced. A. P.-C.

Methods for the quantitative estimation of sodium hyposulfite. BROTHERTON & Co. *Textile Colorist* 44, 585-6; *Pamphlet* by Messrs. Brotherton & Co., Ltd., Leeds. (1922).—Details of the indigo carmine and the silver methods are given, including the prepn. of pure indigo, standard indigo carmine soln., and a description of the app. used.

CHAS. E. MULLIN

Defects developed during dyeing and finishing. E. MIDGLEY. *J. Soc. Dyers Colourists* 38, 180-3; *Textile World* 62, 1127-9(1922).—A discussion of the defects caused by uneven conditioning, use of unsuitable oils, and by crabbing. C. E. M.

Proper use of wood in connection with dyehouses and bleacheries. JOSEPH WOODMAN. *Textile Colorist* 44, 245-7, 303-11, 387-90, 446-9(1922). C. E. M.

Heather effects on hosiery. L. G. HAYES. *Color Trade J.* 11, 202-5(1922).—A discussion of the methods and dyes used for the production of heather effects on hosiery composed of all wool, silk and wool, cotton and wool, and artificial silk and wool.

CHAS. E. MULLIN

The chemist in the textile industry. A. BURTON. *Can. Dyer & Color User* 2, 145-6, 178-9(1922).—A plea for research.

CHAS. E. MULLIN

Observations on textile efficiencies. E. V. CHAMBERS. *J. Soc. Dyers Colourists* 38, 183-6; *Am. Dyestuff Rep.* 11, 127-9(1922).—A discussion of power plant efficiency, fiber, oil and grease recovery, and treatment of waste and refuse. CHAS. E. MULLIN

Chemical research in the power laundry industry. A. F. SHUPP. *Am. Dyestuff Rep.* 11, 336-8(1922). E. J. C.

Mechanical testing of fibers, yarns and fabrics. G. BÖHM. *Z. Ver. deut. Ing.* 66, 1041-3(1922). E. J. C.

The development and future of the production of artificial filaments for the textile industry. C. F. CROSS. *J. Textile Inst.* 13, 167-82(1922).—Annual Mather Lecture.

E. J. C.

Benefits to be derived from a standard raw silk classification. L. C. LEWIS. *Am. Dyestuff Rep.* 11, 335(1922). E. J. C.

Acetose silk. J. O. ZDANOWICH. *J. Soc. Dyers Colourists* 38, 204(1922).—A short description of the process and product made by a process in which H_2SO_4 is almost eliminated in the acetylation.

CHAS. E. MULLIN

The strength of cotton. E. D. WALLEN. *Textile World* 62, 2017-23(1922).—A description of a group method of testing fiber strength.

CHAS. E. MULLIN

The finishing of fine worsteds and woollens. A. JACKMAN. *J. Soc. Dyers Colourists* 38, 177-80; *Am. Dyestuff Rep.* 11, 163-6(1922).—A discussion of scouring methods and the soaps used in scouring, tentering, cutting, blowing and crabbing.

CHAS. E. MULLIN

The acid treatment of cotton fabrics for the production of special finish. BARRINGTON DE PUYSTER. *Color Trade J.* 11, 54-9(1922).—A discussion of the patents covering the treatment of bleached or mercerized cotton with H_2SO_4 , H_3PO_4 , HCl , HNO_3 , ZnCl_2 soln., ammoniacal Cu oxide soln., or nitrosulfuric acid, for the production of a special wool-like finish and feel. The processes may be modified by the action of resists, starch, casein, alternate treatment with NaOH soln., etc. C. E. M.

Character of water to be used in silk weighting. EMILÉ CAGLIOSTRO. *Color Trade J.* 11, 85(1922).—Water contg. 50 to 100 p. p. m. of bicarbonate hardness is recommended for rinsing after the tin bath. Absolutely soft H_2O is best for rinsing after the phosphate treatment.

CHAS. E. MULLIN

A modified steam oven. A. G. PERKIN. *J. Soc. Dyers Colourists* 38, 186-7 (1922).—A description is given of a water oven provided with an attachment whereby the steam from the water passes into the oven for steaming operations.

CHAS. E. MULLIN

The tinting of white papers (HOLMES) 23.

Dye. W. BAUER and A. HERRE. U. S. 1,434,983, Nov. 7. A vat dye is prepd. from 5,7-dichloroisatin and 2,1-naphthoxythiophene by heating in glacial HOAc and HCl at 100° for an hour. The dye is a brown cryst. powder, dyeing cotton from the hypso-sulfite vat brown shades fast to Cl, washing and light.

Azo-lake color. D. E. McALLISTER. U. S. 1,434,619, Nov. 7. Ba and Al lakes are formed from the monoazo dye obtainable by coupling in acid soln. diazotized *p*-nitroaniline-*o*-sulfonic acid with 2,8-aminonaphthol-6-sulfonic acid. The dye is pptd. on a substratum of $Al(OH)_3$ by means of $BaCl_2$. The lake has fair fastness to acids and good fastness to org. solvents such as alc., C_6H_6 , benzene and turpentine.

Dyeing furs and similar materials. P. ONNERTZ. U. S. 1,434,449, Nov. 7. A soln. of 1,4-diamino-2-chlorobenzene and an oxidizing agent such as H_2O_2 in dil. aq. soln. with NH_3 (without acid) is used for dyeing furs, feathers or hair reddish brown. Cf. C. A. 16, 2609.

"Flash-proofing" cloth. W. K. LEWIS and H. C. WEBER. U. S. 1,434,549, Nov. 7. Cloth is immersed in a soln. of $Al_2(SO_4)_3$ and after squeezing out surplus soln. is then immersed in a soln. of Na phosphate, washed and dried.

Laundering textiles. R. A. PHAIR. U. S. 1,435,332, Nov. 14. The material is first treated with soap and a large proportion of Na_3PO_4 or other sol. phosphate and then with soap and Na_2CO_3 and $NaHCO_3$, rinsed, bleached, rinsed again and treated with Na acid fluoride and Na_2SO_4 before another final rinsing.

Souring composition for laundry use. P. L. MABREY. U. S. 1,435,541, Nov. 14. A mixt. of Na silicofluoride (contg. 58% F) 59, oxalic acid 25, alum 8 and NaCl 8 parts.

Scouring and bleaching yarns. J. D. LUMSDEN. U. S. 1,435,864, Nov. 14. Linen and cotton yarns and fabrics contg. dyed threads or fibers are purified by treatment with C_6H_6 , naphtha or a similar org. solvent and are then subjected to a mild scouring by the action of an alk. soln.

26—PAINTS, VARNISHES AND RESINS

A. H. SABIN

Standard conditions for the printing ink industry adopted by the Color Standardization Committee. ANON. *Color Trade J.* 11, 114-5(1922).—The German Comm. on Standardization of the Color Commission decided to adopt the Ostwald color theory for measurement of color tones. Tests are given for fastness to light, water, lacquering, oil, alkali, acid, heat, SO_2 , H_2S , and miscibility.

CHAS. E. MULLIN

Indelible inks and the erasing of writings; their chemico-legal study. A. S. DÍAZ. *Anales asoc. quím. Argentina* 10, 220-8(1922).—The only indelible inks are those contg. free C. $KMnO_4$ soln. followed by $Na_2S_2O_3$ is a much better ink eradicator than the $NaClO$ and $H_2C_2O_4$ solns. commonly used and is effective on aniline inks, on which the latter combination sometimes fails. Halftone reproductions of a number of raised

checks and forged documents photographed in the usual way are given. The erasures and alterations could not be detected by the eye and the papers had been passed as genuine. Accompanying illustrations show the same papers photographed with orthochromatic plates and a yellow light filter. In these the erased writing is faintly visible under the superimposed script and in most cases can be deciphered. L. E. GILSON

The clear-baking insulating varnishes made of copal and linseed oil. S. SAITO AND S. MIZUSHIMA. *Researches Electrotech. Lab. Japan* 116, 31 (1922).—Copal was fused at 150°, 200° and 250°. Three kinds of boiled oil were prepd. with or without driers. Nine samples of insulating varnish were prepd. from these materials and their properties were examd. It is most favorable to stop the fusion of copal when the volatilization loss is 30-35%. The most suitable ratio between fused copal and boiled linseed oil is 15-20 : 85-90. The employment of the driers in oil boiling is recommended.

W. OGAWA

Paint. R. S. LIPSCOMB. U. S. 1,424,901. Nov. 7. Paint for use on metals is formed of linseed oil 1 pint, pulverized bone coal 1 lb. and 1.5 pints of japan drier and varnish.

Worm-proof antifouling paint. O. C. MATTHEWS. U. S. 1,434,304, Oct. 31. A paint adapted for use on wooden ships is formed of kidney oil 1 qt., boiled linseed oil 1 pint, pine oil 1 pint, gloss oil 2 qts., drier 3.2 oz., naphtha 1/2 pint, Ca arsenate 1 lb., Paris green 1 lb., Cu bronze 1 lb., "prince metallic," 2 lbs., cement 3 lbs., "beta fat" 4 lbs., and red Hg oxide 8 oz.

White lead. H. GREGORY. U. S. 1,435,707, Nov. 14. Corrosion of Pb with CO₂ is promoted by the use of steam to heat Pb in pots surrounded by decomposing tan bark or straw to a temp. of max. reaction, which is maintained until the corrosion is completed.

White-lead mixture for coating glass. J. WALSH. U. S. 1,434,514, Nov. 7. White lead 25 lbs., linseed oil 1 gal., gasoline 5 gals. and turpentine 0.5 pint form a mixt. adapted for coating the glass of greenhouses.

Varnish. C. TUSCHEL. U. S. 1,435,350, Nov. 14. A varnish which may be used on automobiles is prepd. by boiling India white gum 4 oz. in H₂O 1 gal., adding 4 oz. NaOH, allowing the product to dry, pulverizing it, dissolving it in 3 qts. alc. with 6 g. D. C. sbellac, 3 g. Siam benzoin gum, 5 g. gum elemi, 8 oz. filtered petroleum, 4 oz. oil of rose, and 4 oz. of free fatty acid. After filtration, sandalwood ext. 6 g. is added.

Resinous substances from phenol and sulfur. A. BLUMFELDT. U. S. 1,435,801, Nov. 14. PbOH, cresol or other phenol is heated with S to about 130-140° in the presence of KHS or other basic substance in not more than 1/4 the amt. which would be required to neutralize the phenol. A resinous product is thus obtained which is rendered infusible and insol. in org. solvents on heating.

27—FATS, FATTY OILS, WAXES AND SOAPS

E. SCHERUBEL

Present position of fat hardening. W. NORMANN. *J. Soc. Chem. Ind.* 41, 469-71R (1922).—An abridged translation (see C. A. 16, 3405).

Native oil production in Western China. H. K. RICHARDSON. *Chem. Met. Eng.* 27, 1032-6 (1922); illus. E. J. C.

Definition of cod oil. ANON. *Analyst* 47, 475 (1922).—A legal case is reviewed. E. J. C.

The fatty oil of Hibiscus cannabinus. J. DEKKER. *Pharm. Weekblad* 59, 1296-9 (1922).—*Hibiscus cannabinus*, a textile plant recently introduced into Java, yields an

oil-bearing seed of fat content 18-23% calcd. on the dry basis. Dctns. of sp. gr., sapon., Helmer, Reichert-Meissl and I numbers, and m. p. of fatty acids, gave values very close to those of peanut oil. The press cake contains no poisonous constituents, and offers possibilities as a cattle feed. A. W. DOX

Rapid method for the determination of the acidity of palm oil. A. STRILYJES. *Bull. mat. grasses* 1921, Nos. 7-8, 113-5.—Fill with palm oil (previously heated to 40-50° if necessary) a small buret with a single graduation corresponding to 7.8 cc. (exclusive of tip below cock). Deliver to a 200-cc. Erlenmeyer flask, wash out the buret with 40 cc. of previously neutralized alc. (in several portions), and titrate with 0.5 N NaOH, from a buret graduated from 0 to 80, each graduation corresponding to 0.5 cc. The reading gives the acidity directly as oleic acid. A. P.-C.

The neutralization of castor oil. S. FACHINI AND S. SOMAZZI. *Boll. olii e. grassi* 1, 53-6(1921); *Chimie et industrie* 8, 864(1922).—The color of medicinal castor oil should be as light as possible and the acidity zero. The proteins are usually coagulated by prolonged boiling with water, but this does not affect the color and acidity. The greenish yellow color of oil from second pressings is particularly resistant to the action of bleaching agents. The coloring matters, of which there seem to be at least two, are in colloidal suspension. Animal charcoal, which acts on both positive and negative colloids, gives a reddish color to the oil. Castor oil easily emulsifies, and the soaps formed from the hydroxy acids easily dissolve in the oil, rendering it extremely difficult to filter. Treating with MgO (1%) and animal charcoal (2.5%) caused the acidity to decrease for the first 4 hrs., but it then remained const. for 24 hrs. and more. It is recommended to treat the oil with the usual amt. of fuller's earth, or preferably with a mixt. of fuller's earth and animal charcoal, and with a slight excess of NaOH dissolved in sufficient water so that the paste will contain 30% of water, agitate at 25-30°, add 2.5% of CaCl₂, let stand at 30°, and filter. NaCl does not act as well as CaCl₂. A. P.-C.

The measurement of the solubility of soap. E. LUKSCH. *Seife* 7, 549-50(1922); *Chimie et industrie* 8, 865(1922); cf. C. A. 16, 4084.—Make a cylindrical hole 10 mm. in diam. in a 20-cm. cube of the soap. Fit 2 brass tubes to the extremities of the hole to allow the water to flow through. After a definite time det. the loss in wt. The duration of the expt. cannot be stated *a priori*; but it must naturally be stopped if the soap cracks or breaks. The method is useful for works control. A more complicated app. is described for carrying out tests based on the same principle. A. P.-C.

28—SUGAR, STARCH AND GUMS

F. W. ZERBAN

Recollections of Armand Vivien. H. COLIN. *J. fabr. sucre* 63, No. 48(1922).—A brief review of the life work of V. L. E. GILSON

Saillard's method for the determination of reducing sugars in the presence of sucrose. EMILE SAILLARD. *J. fabr. sucre* 63, No. 44(1922).—Complete details and a table of calcs. are given. Soln. a contains 34.63 g. CuSO₄ crystals in 500 cc. Soln. b contains 173 g. Rochelle salt and 65 g. of 93% NaOH in 500 cc. These solns. are used like Fehling's except that the pptn. is carried out at 63-4°. It is thought that the decreased amt. of NaOH used and the lower temp. lessen the error due to reaction with the sucrose. L. E. GILSON

Chemical progress in cane-sugar manufacture. G. L. SPENCER. *Ind. Eng. Chem.* 15, 10-11(1923). E. J. C.

Sugar formation in, and ripening of, sugar cane. J. KUYPER. *Arch. Suikerind.: Mededeel. Proefstat. Java-Suikerind.* 1922, Nn. 5, 195-321.—The formation of org. matter results from the effect of light and of chlorophyll; the first of these factors cannot

be augmented, but the second can be regulated by proper selection of varieties of healthy seed cane and by correct methods of planting and cultivation. Generally, heavy yields of cane go hand in hand with low rendements of sugar, and *vice versa*. Field samples for maturity tests must not be selected at time of sampling, but the stalks later to be used for sampling should be marked at the beginning of the growing season. The wt. of the stalk bears no relation to its state of maturity, but the analysis of stalks, divided into lower, middle, and upper part, gives important indications. Division into 10 parts entails too much labor, but halving is not sufficient. By the application of tripartite analysis it has been found that maturity is affected by the month of planting. The effect of location and other factors also shows in the relative compn. of the 3 parts of the stalk; thus the middle portion is sometimes richer in sugar than the lower third, particularly in certain varieties. The compn. of the scp. portions, especially the purity in the lower third, is largely affected by rainfall and other climatic conditions. Detn. of glucose in the juices is unnecessary, because it is a dependent variable. The estn. of the sp. gr. of the stalk is of no value, as it is not affected by the maturity of the cane, although it gives important indications about the cane being in a diseased condition.

F. W. ZERBAN

Recent progress in the chemistry of sirups and molasses. F. W. ZERBAN. *Ind. Eng. Chem.* 15, 7-9(1923).

E. J. C.

A study of the "factor of safety" of sugars with special reference to methods required for the manufacture of sugars conforming thereto. WM. L. OWEN. *Intern. Sugar J.* 24, 581-6, 644-8(1922).—Exptl. data are given on the compn. of sugars made in the lab. from sirups of various purities, and the deterioration of these sugars when inoculated with species of mold fungi, and stored for definite periods. The validity of the "factor of safety" as a criterion of the keeping quality of sugars is attributed to the fact that it denotes a condition of the compn. of the film of molasses, which is unsuitable for the development of microorganisms. To conform to the "factor of safety" a sugar must be crystd. from a soln. of such a purity, that it will yield an exhausted molasses as a protective film for the crystals. Sugar deterioration is shown to be dependent upon surface exposure as well as upon the density of the film of molasses surrounding the sugar crystals.

W. L. OWEN

The "Darco" decolorizing-carbon process in cane-sugar refining. H. H. DANN. *Intern. Sugar J.* 24, 630-5(1922).—The process described consists in mingling and washing the raw sugar, melting, mixing "Darco" with the melt, filtration of the Darco treated melt, prepn. of the exhausted Darco for the furnace, revivification, and the boiling and curing of the sugar. The raw sugar should be mingled and washed to as high purity as practicable before treating with Darco. The filtration should be under careful supervision. A check filter should be used to remove any particles of carbon coming through the first presses. The exhausted Darco should be mixed with a large quantity of boiling water before sending the carbon to the revivification furnace. The revivification process demands careful mechanical and chem. control.

W. L. OWEN

Boiling-house methods in Hawaii. H. S. WALKER. *Intern. Sugar J.* 24, 637-44 (1922).—In reply to a questionnaire on the effect of temp. in clarification, means of removing scale from evaporator heating surface and general methods of boiling, including the boiling of low-grade massecuite, some factories reported that temps. lower than 100° gave a poorer clarification than that obtained by heating the juice to 100°. W. believes that just as good clarification is obtained but the settling of the juice is slower at the lower temp. NaOH is more efficient as a scale remover than the carbonate. Good results are obtained by using a 50% soln. but an equally good method consists in using a 10% soln., boiling for 30 min., draining off the liquor and turning on the steam.

The boiling method that seemed to have been favored is the one now in use, which consists in making only one purity first massecuite and taking back sufficient molasses into each strike to lower its purity to about 76-87. The feature of the year in low-grade boiling is the very general adoption of powdered sugar for forming grain. The time for complete crystn. and the effect of adding water to massecuites are discussed.

W. L. OWEN

Significance of presence of oxalates in evaporator incrustations. Also a new sensitive color test for oxalic acid. CH. MÜLLER. *Intern. Sugar J.* 24, 523(1922).—A relationship is shown between the evaporating efficiency of each body of a multiple effect and the qual. compn. of the incrustations on the coils. The alkaline earth oxalate incrustations have the greatest retarding effect upon the boiling efficiency of evaporators. To detect oxalic acid, wash with boiling water 100 g. of the incrustation until free from sugar as shown by the α -naphthol and H_2SO_4 test. Treat with 300 cc. of H_2SO_4 (1 : 10), filter, boil and make up to 50 cc. Evap. 10 cc. of this soln. almost to dryness in a test-tube, add a pinch of pure resorcinol and pour 2 cc. H_2SO_4 down the walls of the tube. A green or blue ring, which becomes azure blue after agitation and violet upon further heating, is characteristic of oxalic acid.

W. L. OWEN

A new British saccharimeter. L. BELLINGHAM AND F. STANLEY. *Intern. Sugar J.* 24, 587-90(1922).—The most serious defects of the present-day saccharimeters are: The cement used in the optical parts is subject to rapid deterioration, especially in the tropics. The edge of the Lippich half prism is very fragile and is apt to disintegrate causing a loss of sensitiveness. The long quartz wedge used for the compensation of the rotation of the sugar soln. is incorrect at intermediate points on the scale. The optical elements are not easily reached for cleaning. The stand of the instrument is of too complicated a design. These defects have been corrected in the new saccharimeter. The most important innovations are: No cement is used on the polarizing prism which is constructed of two solid rhombs of spar. The polarizing unit is so placed that it can be quickly removed for cleaning. The quartz-wedge compensation is constructed on an entirely new principle as regards its mounting, the principal feature of which is the fine adjustment of the wedges. This adjustment can be made with such accuracy that the instrument will give the correct scale length to 0.01 sugar degrees. The scale is calibrated for the international wt. of 26.0 grams, but it can be easily adjusted to a different standard should this be necessary as a result of the adoption of a new normal wt.

W. L. OWEN

Recovering sucrose from solutions. A. S. RAMAGE. U. S. 1,433,654, Oct. 31. $Pb(OH)_2$ is added to a sucrose soln. in sufficient excess to ppt. sucrose together with non-sucrose substances and after sepn. of the ppt. sucrose is liberated from it by limited carbonation. The Pb-bearing sucrose soln. thus formed is sepd. and freed from Pb by use of lime. The residual ppt. contg. non-sucrose substances is treated with hot NaOH soln. in excess to dissolve non-sucrose substances and convert most of the Pb content of the ppt. into $Pb(OH)_2$. The latter is sepd. from the soln. and is used for continuing the process with fresh quantities of sucrose soln. U. S. 1,433,655 specifies subjecting a crude ppt. contg. Pb succrate to such limited carbonation that a sucrose soln. and a crude ppt. contg. $PbCO_3$ and org. substances are produced. After sepn. of the sucrose soln., the ppt. is treated with hot caustic alkali soln. to dissolve the org. matter and transform most of the Pb compds. into $Pb(OH)_2$.

30—RUBBER AND ALLIED SUBSTANCES

JOHN B. TUTTLE

Effect of mold on quality of smoked sheet. H. P. STEVENS. *Bull. Rubber Growers' Assoc.* 4, 330-1(1922); cf. *C. A.* 16, 661, and succeeding abstr.—Two samples of smoked sheet on which "black and yellow pin-head types" of mold had developed showed rates of cure 13% and 16%, resp., greater than a control sheet. A sample of smoked sheet upon which a gray-green mold had grown showed a rate of cure about 7% less than a control.

G. S. WHITBY

Additional tests with sodium fluosilicate. H. P. STEVENS. *Bull. Rubber Growers' Assoc.* 4, 331-3(1922); cf. *C. A.* 16, 1884, and preceding abstr.—Twenty-seven samples of smoked sheet prep'd. from latex to which Na_2SiF_6 had been added showed, in a rubber-S mixt., a rate of cure lower by 10-15% than that of control samples. The reagent in question was without effect on tensile strength; it was not, in proportions from 1.5 to 16 g. per sheet, effective in preventing the growth of mold on rubber packed in a wet condition. Such wet-packed rubber developed "greenish, yellow, or black" mold "of the usual 'pin-head' variety," and showed a rate of cure appreciably slower than that of non-moldy sheets.

G. S. WHITBY

Modified application of sodium fluosilicate. H. P. STEVENS. *Bull. Rubber Growers' Assoc.* 4, 592-3(1922); cf. preceding abstrs.—The effectiveness of Na_2SiF_6 in preventing the growth of mold on smoked sheet is increased if the usual practice of washing and brushing down the sheets after smoking is omitted. Vulcanization tests on sheets prep'd. after adding amts. of Na_2SiF_6 ranging from 1.5 to 40 g. per 3,300 cc. standardized latex showed that all such sheets cured about 10% more slowly than a control sheet.

G. S. WHITBY

Keeping qualities of rubber prepared with sodium fluosilicate. H. P. STEVENS. *Bull. Rubber Growers' Assoc.* 4, 591-2(1922).—A limited number of tests indicate that the use of Na_2SiF_6 in the prepn. of rubber has no unfavorable effect on aging.

G. S. W.

The role of calcium chloride in the coagulation of the latex of *Hevea brasiliensis*. G. VERNET. *Compt. rend.* 175, 719-21(1922).—Expts. showed that CaCl_2 accelerated the coagulation of the latex of *Hevea* and at the same time produced an increase in wt. of the rubber obtained from the latex. It is suggested that in the presence of the sol. phosphates of the latex, the CaCl_2 decomposes to form less sol. phosphates of Ca which remain incorporated in the rubber while the Cl is attached to the albuminous material which coagulates. The increased wt. of the gum has a double origin due to (1) rapid and complete coagulation caused by the Cl and (2) incorporation in the rubber of less sol. mineral matter (Ca phosphates) and a combination of Cl with insol. albuminoids.

F. C. COOK

Electrical test for rubber gloves. E. Y. RICE. *Elec. World* 80, 615(1922).—Brief account of tests up to 100,000 v. The gloves are subjected to a breakdown and a leakage test.

C. G. F.

Rubber-like composition. J. C. WICHMANN. U. S. 1,435,359, Nov. 14. A rubber-like material is made by heating fleshy portions of the yucca plant, to distil volatile substances, redistg. the condensate to drive off resinous and retain gummy substances, mixing the latter with S, asphaltum and Para gum in soln., beating all the ingredients together to form a homogeneous product and drying and oxidizing it. Cf. following pat.

Rubber-like composition. J. C. WICHMANN. U. S. 1,435,360, Nov. 14. Fleshy portions of plants of the cactus family are heated to above 100°, their juice is extd.,

mixed and boiled with S, elaterite, asphaltum, Para rubber dissolved in turpentine, Na tungstate and acetone, and the compn. thus obtained is dried and oxidized. It is suitable for use in making tire casings or rubber heels. Cf. preceding pat.

Multi-ply rubber articles. M. M. HARRISON and H. A. MORTON. U. S. 1,434,892, Nov. 7. Multi-ply material adapted for subsequent vulcanization is formed of rubber layers, some contg. S and other adjacent layers contg. a vulcanization accelerator.

Vulcanizing rubber. R. P. ROSE. U. S. 1,433,099, Oct. 24. C, clay or other material which has been activated in the form of a substantially dry powder is added to rubber compns. before vulcanization, in order to obtain a tough, hard product.

Vulcanizing rubber. H. A. MORTON and M. M. HARRISON. U. S. 1,434,908, Nov. 7. In the use of 2 substances, *e. g.*, S and a vulcanization accelerator, which co-act in rubber compns. to promote vulcanization, one of the substances is first mixed throughout the rubber and the other is applied to its surface and afterward worked into the mass.

Vulcanizing rubber. H. A. MORTON. U. S. 1,434,900, Nov. 7. Tertiary amyl-amine is used as an accelerator.

